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5.15 PUBLIC HEALTH

This section presents the methodology and results of a human health risk assessment performed to assess potential public health impacts associated with airborne emissions from the construction, commissioning, routine and temporary operations of the proposed SSU6 Project. Tables and figures are found at the end of this section.

The routine operation analysis evaluated potential emissions of "air toxic" compounds from the cooling towers, the dilution water heaters, the operations and maintenance equipment, and the emergency diesel generators and fire pump. The construction analysis examined the effects of the potential emissions from the diesel equipment used for construction of the plant and well drilling, along with well flow testing. The commissioning analysis examined emissions from the steam vent tanks, the cooling towers, the dilution water heaters, the production test unit and the steam blow lines. Emissions resulting from temporary operations will come from well drilling and testing, plant startups, and plant trips. For all operational phases of the SSU6 Project, impacts from radionuclides as well as other air toxics were evaluated in the risk assessment analysis. Radionuclides are contained in the geothermal fluid that will drive the power generation process and are anticipated to be emitted from the cooling towers, steam vent tanks, steam blow lines, production test unit and the filter cake, as described below. A supplemental analysis of the radionuclides was also conducted to provide insight into the possible uncertainties associated with the prediction of radon induced health impacts.

Air toxics are compounds that are known or suspected to cause short-term (acute) and/or long-term (chronic or carcinogenic) adverse health effects. These compounds are addressed in this Section, while "Criteria Pollutants" (compounds with ambient air quality standards) are addressed in Section 5.1, and the potential impacts on public health of these pollutants are summarized in Section 5.15.2.3. All other substances that are emitted from the SSU6 Project, such as trace amounts of metals, are listed in the emissions tables in Appendix G. Also of concern with respect to public health are potential exposures to electric and magnetic fields (EMF). Potential public health impacts from electromagnetic exposure are discussed in Section 5.15.2.4.

Air is the dominant pathway for public exposure to chemical substances that will be released by the SSU6 Project. Emissions to the air will consist of small amounts of air toxics found in the brine and combustion by-products produced by the diesel burning equipment. Potential health risks from multiple exposure pathways, including inhalation, were addressed for the identified sensitive receptors surrounding the site and at numerous other receptor points out to a distance of 3 miles from the SSU6 Project site. The multipathway health risk assessment was conducted in accordance with guidance established by the California Air Pollution Control Officers Association (CAPCOA).

Hazardous waste may be generated at the SSU6. A hazardous waste management plan will be in place so that the potential for public exposure will be minimal. Refer to Section 5.13 for more information. Section 5.14 provides more detailed information on hazardous chemicals that will be stored and used on site and the potential impacts associated with their use and storage.

5.15.1 Affected Environment

For purposes of the air quality and public health exposure assessments, the main emission source, the cooling towers, will exhaust at approximately 58 feet (17.68 meters) above grade elevation (-230 feet or -70 meters). Topographical features within 10 miles that are of equal or greater elevation than the assumed stack exhaust exit point (stack height plus grade elevation; -172 feet or -52 meters) are shown on Figure 5.15-1 and Figure 5.15-2.

Sensitive receptors are defined as individuals that may be more susceptible to health risks because of chemical exposure. Schools, day care facilities, convalescent homes, and hospitals are of particular concern, although none of these land uses exist within 3 miles of the plant site. The nearest sensitive receptor to SSU6 is the residence at the Sonny Bono National Wildlife Refuge (the Refuge), northeast of the proposed facility. Only five sensitive receptors were identified within a 3-mile radius of the plant site, all residences, are shown on Figure 5.15-3, along with the population distribution in this area.

To ensure there are no existing health concerns in the region, a search was conducted for any previous health studies conducted for the population within a 6-mile radius of the plant site; none was found.

5.15.2 Environmental Consequences

The methods used to assess potential human health risks from routine operations are consistent with those presented in the document prepared by the CAPCOA, *Air Toxics "Hot Spots" Program: Revised 1992 Risk Assessment Guidelines* (CAPCOA 1993). The CAPCOA guidelines provide risk assessment procedures for use in the preparation of the health risk assessment required under the Air Toxics "Hot Spots" Information and Assessment Act of 1987, AB 2588 (Health and Safety Code Section 44360 et seq.). The "Hot Spots" law established a statewide program for the inventory of air toxics emissions from individual facilities, as well as requirements for risk assessment and public notification of potential health risks.

The air toxics health risk assessment was conducted in three basic steps. First, hazard identification was performed to determine pollutants of concern associated with the project construction activities, commissioning, routine operations and temporary operations. Second, an exposure assessment was performed that included toxic air contaminant emission calculations and the simulation of pollutant transport using atmospheric dispersion modeling. Third, a risk characterization was performed analyzing potential health risks from multi-environmental pathway exposure to each air toxic dependent on the dispersion modeling, which included identifying the location of maximum cancer and non-cancer health risks. The multipathway analysis included the inhalation pathway, dermal (skin) absorption, ingestion of soil with deposited pollutants, plant pathway, and exposure to pollutants potentially in mothers' milk. Consideration of these pathways is consistent with risk screening procedures contained in the CAPCOA Guidelines (CAPCOA 1993). A supplemental radionuclide assessment was conducted to analyze the emissions and dispersion of radon from various components of the SSU6 Project, as discussed in detail in Section 5.15.2.2.

5.15.2.1 Air Toxics

5.15.2.1.1 Air Toxics Health Risk Methodology

Hazard Identification

The hazard identification involved an evaluation of operations associated with each phase of the project to determine whether there are particular substances that will be used or that may be generated, which may cause negative health effects if released into the air. The air toxics evaluated in this analysis were identified from the CAPCOA guidelines (CAPCOA 1993), the California Environmental Protection Agency (Cal/EPA) and the California Office of Environmental Health Hazard Assessment (OEHHA) Technical Support Document for Describing Available Cancer Potency Factors (Cal/EPA 1999b), The Determination of Acute Reference Exposure Levels for Airborne Toxicants for Airborne Toxicants (Cal/EPA 1999a), and The Determination of Chronic Reference Exposure Levels (Cal/EPA 2000c). Also included are the newly added air toxics to the OEHHA lists of Cancer Potency Factors, Acute Reference Exposure Levels and Chronic Reference Exposure Levels (OEHHA 1999, 2000, and 2001).

Table 5.15-1 presents the list of air toxics that can be expected to be emitted from each of the sources associated with the SSU6 Project. Table 5.15-2 presents the cancer, chronic and acute non-cancer effects along with the chronic and acute non-cancer toxicological endpoints for each of the air toxics listed in Table 5.15-1. Table 5.15-3 lists the cancer unit risk factor, acute Reference Exposure Level (REL) and chronic REL for each air toxic to be used in the health risk assessment modeling.

Significance Criteria

<u>Cancer Risk</u>

Cancer risk is the probability or chance of contracting cancer over a human life span (assumed to be 70 years). Carcinogens are assumed not to have a threshold below which there would be no human health impact. In other words, any exposure to a carcinogen is assumed to have some probability of causing cancer; the lower the exposure, the lower the cancer risk (i.e., a linear, no-threshold model). The CEC along with various state and local agencies consider an incremental cancer risk of 10 in one million as the result of a project to be a significant impact on public health. For example, the 10-in-one-million risk level is used by the Air Toxics “Hot Spots” (AB 2588) program and California’s Proposition 65, as the public notification level for air toxic emissions from existing sources. For assessing the significance of potential risks from SSU6 emissions, a significant impact criterion for lifetime incremental cancer risk of 10 in one million is appropriate.

The lifetime risk of cancer from all causes combined is about 400,000 in one million (or about 40 percent) in the United States today (National Cancer Institute 2000). Environmental and occupational exposures are generally thought to be responsible for a small portion of this background risk. However, environmental and occupational carcinogens are a principal focus of regulatory policy because the public’s exposure is often involuntary, and in principle can be reduced by regulatory initiatives.

Non-Cancer Risk

Non-cancer health effects can be either chronic or acute. In determining potential non-cancer health risks (chronic and acute) from air toxics, it is assumed that there is a threshold dose of the chemical of concern below which there would be no impact on human health. In other words, there is a threshold below which no effects occur. The air concentration corresponding to this dose is called the reference exposure level (REL), and for the non-inhalation environmental pathways, the threshold dose is typically expressed in terms of the reference dose (RfD), which is an allowable daily dose per body weight (mg/kg-day). Non-cancer health risk is measured in terms of a hazard quotient, which is the calculated dose of each contaminant divided by its REL or RfD. Hazard quotients for those pollutants that affect the same target organ are typically summed, and the resulting totals expressed as hazard indices for each organ system. A hazard index of less than 1.0 is considered an insignificant health risk. The acute RELs and RfDs used in the hazard index calculations for the SSU6 Project were those published by OEHHA in May 2000 (OEHHA 2000). The chronic RELs used were those updated by OEHHA in December 2001 (OEHHA 2001). Any acute or chronic REL not updated by OEHHA was obtained from the CAPCOA Guidelines (CAPCOA 1993).

Chronic toxicity is defined as adverse health effects from prolonged chemical exposure, and is caused by chemicals accumulating in the body. Because chemical accumulation to toxic levels typically occurs slowly, symptoms of chronic effects usually do not appear until long after exposure begins. The lowest no-effect chronic exposure level for a non-carcinogenic air toxic is the chronic REL. Below these thresholds, the body is capable of eliminating or detoxifying the chemical rapidly enough to prevent its accumulation. The chronic hazard index was calculated using the hazard quotients calculated with annual concentrations.

Acute toxicity is defined as adverse health effects caused by a brief chemical exposure of no more than 24 hours. The air concentration required to produce acute effects is higher than levels required to produce chronic effects because the duration of exposure is shorter. Acute toxicity is predominantly manifested in the upper respiratory system at threshold exposures. One-hour average concentrations are divided by acute RELs to obtain a hazard index for health effects caused by relatively high, short-term exposure to air toxics.

Exposure Assessment Methods

Air Toxic Emissions

A detailed discussion of the emission sources from the project can be found in Sections 5.1.2.2, 5.1.2.3 and 5.1.2.4 and Appendix G.

Consistent with modeling performed for criteria pollutants, annual emissions of toxic contaminants resulting from the SSU6 Project power generation equipment were calculated assuming 8,760 hours per year of operations. The various diesel engines were assumed to operate between 150-400 hours per year. These assumptions were used to calculate the annual average emissions, which were then used in the calculations of carcinogenic and chronic non-cancer health effects during routine operations. For acute non-cancer health impacts, maximum hourly emissions were used for all sources during all operational phases. Emission rates are summarized in the subsequent sections discussing each operational phase.

Dispersion Modeling Methodology

Atmospheric dispersion modeling was performed to estimate offsite, ground-level concentrations of toxic air contaminants that may be emitted from the SSU6 Project. Modeling methodologies, including meteorological data selection, follow those discussed for the refined modeling analysis in Section 5.1.2.5. The US EPA approved ISCST3 model was used with unit emission rate per source to estimate the ground-level concentration per unit emission rate (X/Q) in all terrain settings based on five years (1995 to 1999) of Imperial County Airport meteorological data. Upper air data used for daily mixing heights were collected in Tucson, Arizona.

To identify the point of maximum impact (PMI), a multi-scale grid of receptors was used in the ISCST3 modeling, the same receptor grid as in the air quality modeling, except extending out to a distance of 5 kilometers from the proposed project site. The following receptor grid spacing was used in the risk assessment modeling analysis:

Along fence line	30-meter spacing
From fence line to 0.5 km (downwash)	30-meter spacing
From 0.5 km to 1 km	100-meter spacing
From 1 km to 5 km	250-meter spacing

To identify the maximum exposed individual (MEI), either an existing resident or occupational worker, all sensitive receptors identified within a 3-mile radius from the plant site were included as discrete points in the model receptor grid. Five sensitive receptors were identified within 3 miles of the proposed plant, all residences (See Figure 5.15-3). The closest residence is in the Refuge.

The ISCST3 modeling results were then incorporated in the health risk analysis using the ACE 2588 model. ACE 2588 uses an ISCST3 binary output file in conjunction with source emission rates and toxicity factors, to calculate human health effects. For cancer risk, estimated ground level concentrations of each substance, in micrograms per cubic meter [$\mu g/m^3$] (microCurie per cubic meter [$\mu Ci/m^3$] for radon), were multiplied by its cancer "unit risk factor," which is the estimated cancer risk for a continuous exposure to 1 $\mu g/m^3$ (1 $\mu Ci/m^3$ for radon) over a specified averaging time, which is usually assumed as 70 years in a lifetime cancer risk estimate. The cancer unit risk factors were obtained from the updated technical support documents (Cal/EPA 1999b) and (OEHHA 1999). The radon cancer unit risk factor was derived from the slope factor provided in the Health Effects Assessment Summary Tables (HEAST) (US EPA 2001 and 1998), as described in the next section. Table 5.15-3 summarizes cancer unit risk factors used in the health risk assessment modeling.

For chronic non-cancer health effects, calculated annual exposures were divided by pollutant-specific chronic RELs published by OEHHA (Cal/EPA 2000a and OEHHA 2001) and CAPCOA (1993), and the resulting quotients were summed by the ACE 2588 model for each affected target organ, to calculate a chronic hazard index. For acute non-cancer health effects, calculated maximum hourly exposures were divided by pollutant-specific acute RELs published by OEHHA (Cal/EPA 1999a and OEHHA 2000), and summed by the ACE 2588 model for each affected target organ, to calculate an acute hazard index. Table 5.15-3 summarizes chronic and acute non-cancer RELs used in the health risk assessment modeling.

Electronic input and output files for the ISCST3 dispersion modeling and ACE 2588 health risk runs will be submitted on CD-ROM to the CEC and the ICAPCD under separate cover.

Risk Characterization

Carcinogenic risks and potential chronic and acute non-cancer health risks were assessed using the dispersion modeling methods described above and numerical values of toxicity recommended in the OEHHA technical support documents (Cal/EPA 1999a, 1999b and 2000a), the OEHHA updated chronic and acute RELs and cancer potency and unit risk values (OEHHA 1999, 2000 and 2001), the CAPCOA Guidelines (CAPCOA 1993) and HEAST (US EPA 2001). The radon cancer unit risk factor was derived from the slope factor, 2.2×10^{-4} fatal cancers per Working Level Month (WLM), provided by the US EPA (1998 and 2001). One WLM is equal to 170 hours of exposure at a concentration of 1 Working Level (WL), and 1 WL is equivalent to a concentration of 100 pCi/L at 100 percent daughter equilibrium (Cember 1983). The standard US EPA 10 percent radon equilibrium was applied (US EPA 1996). The slope factor was converted to fatal cancers per pCi/m^3 per year as follows:

$$RCF_{1,Rn}\left(\frac{fatal\ cancers}{pCi/m^3}\ per\ year\ \text{exposure}\right) = (0.10 equilibrium)\left(2.2x10^{-4}\ \frac{fatal\ cancers}{WLM}\right)\frac{\left(8{,}760\,\frac{hr}{yr}[WLM]\right)}{\left(170\,\frac{working\ hr}{month}[WL]\right)}\left(\frac{1\,WL}{100\,pCi/L}\right)\left(\frac{1m^3}{1{,}000L}\right)$$

The result is 1.13×10^{-8} fatal cancers per year of exposure per pCi/m^3. This risk factor is the fatal cancer risk for an individual exposed outdoors for 24 hours a day, 365 days per year for one year. For a 70-year exposure, the risk is multiplied accordingly, $1.13 \times 10^{-8} \times 70 = 7.94 \times 10^{-7}$ fatal cancers per pCi/m^3 (or 7.91×10^{-1} cancers per µCi/m^3). Table 5.15-3 summarizes the cancer unit risk factors, and the chronic and acute non-cancer RELs used in the health risk assessment modeling.

The environmental pathways analyzed by means of the ACE2588 model included inhalation, dermal absorption (skin), soil ingestion, plant exposure, and exposure through mothers' milk as recommended in the CAPCOA guidelines (CAPCOA 1993) for a health risk assessment. These are summarized in Table 5.15-2. For a screening level health risk assessment, only the maximum offsite cancer risk needs to be estimated, population burden need not be calculated for individual population units. The CAPCOA guidelines recommend that "for an estimate of the maximum potential cancer burden, it can be conservatively assumed that the exposed population's risk is the same as the maximum offsite cancer risk."

The chief exposure assumption for the cancer and chronic risks is one of continuous exposure (at maximum emission rates) over a 70-year period at each identified receptor location. When combined with US EPA approved dispersion modeling methodologies, the use of OEHHA and CAPCOA cancer potency factors and RELs/RfDs, provide an upper bound estimate of the true risks. That is, the actual risks are not expected to be any higher than the predicted risks and are likely to be substantially lower. A discussion of uncertainty factors follows.

Uncertainties in the Analysis

Predictions of future health risks related to the proposed project are characterized by uncertainties because of gaps in scientific knowledge in the practice of risk assessment, as well as the need to simplify some aspects of the process for a manageable computational effort. There are model and data uncertainties with respect to the assumed emissions, dispersion modeling and toxicological factors. There are also uncertainties regarding the characteristics of the potentially exposed population. For example, parameters of possible exposure scenarios may include one or more of the following: that a person may be assumed to reside in one location for the average period of U.S. residency (about nine years); or for the 90th percentile of residency (about 30 years); or for an entire lifetime (about 70 years); and that exposure may be assumed at the highest modeled concentration, or some average, or a modestly high concentration representative of the exposed population.

Because risk assessments are often performed to set some regulatory limit on exposure to protect the public health, the assumptions of risk assessment have tended to more likely overestimate risk rather than underestimate it. The risk assessment methodology described above followed the CAPCOA Guidelines (CAPCOA, 1993), which are designed by regulators to more likely overestimate than underestimate health risks. The following discussion provides qualitative assessments of the uncertainties and variability in the major areas of an air toxics health risk assessment.

Emissions

The emission factor estimates for the project may be overly conservative because of the limited source test data used to derive these factors. Additionally, for both the one-hour and annual averaging periods, it was assumed that all equipment operated continuously at maximum load conditions. For evaluation of the long-term (cancer and chronic) health risks resulting from routine operations, maximum load operation for the turbine and ancillary equipment was assumed to occur for 8,760 hours per year, and the remaining equipment were assumed to operate between 150 - 400 hours per year. For evaluating the short-term health risks, extra conservatism was added to the analysis by assuming that during the worst hour all equipment would operate simultaneously and at maximum load for the full hour. To ensure that the maximum hourly concentrations would not be underestimated, these maximum emissions were used with five years of hourly meteorological data in the ISCST3 modeling, and the highest predicted values were selected to represent acute risks from the ACE2588 model results. The air toxic substances modeled were those emitted from the SSU6 Project that have toxicity criteria in the OEHHA and CAPCOA risk assessment guidelines.

Air Dispersion Modeling

In general, EPA-approved dispersion models such as ISCST3, tend to over-predict concentrations rather than under-predict them. The Cal/EPA *Air Toxics Hot Spots Program Risk Assessment Guidelines* (Cal/EPA 2000b) state "air dispersion models used in Hot Spots program do not consider chemical reactions. Atmospheric reactions (including photolysis) will decrease atmospheric concentrations for chemicals that react (or photolyze). The air modeling will thus tend to overestimate concentrations for these chemicals." Lastly, air dispersion models use assumptions about plume dispersion that tend to over-predict concentrations.

Exposure Assessment

The most important uncertainties related to exposure concern the definitions of exposed populations and their exposure characteristics. The choice of a maximally exposed individual

(MEI) is very conservative in the sense that no real person is likely to spend 24 hours a day, 365 days a year, over a 70-year period, at exactly the point of highest toxicity-weighted annual average air concentration. The greatest true exposure that would actually be experienced is likely to be at least 10 times lower than that calculated using the MEI assumption.

Toxicity Assessment

The final area of uncertainty is in the use of toxicity data in risk estimation. Estimates of toxicity for the health risk assessment were obtained from the OEHHA Technical Support Document for Describing Available Cancer Potency Factors (Cal/EPA 1999b), OEHHA The Determination of Acute Reference Exposure Levels for Airborne Toxicants (Cal/EPA 1999a), OEHHA The Determination of Chronic Reference Exposure Levels for Airborne Toxicants (Cal/EPA 2000a), US EPA Health Effects Assessment Summary Tables (HEAST) (US EPA 2001), and the CAPCOA Air Toxics "Hot Spots" Revised 1992 Risk Assessment Guidelines (CAPCOA 1993), which are among the most conservative compilations of toxicity information. Toxicity estimates are derived either from observations in humans or from projections derived from experiments with laboratory animals. Human data are obviously more relevant for health risk assessments but are often uncertain because of difficulty in estimating exposures associated with the health effect of interest; insufficient numbers of people studied; relatively high occupational exposures (the source of most human data), which must be extrapolated to low environmental exposures; or because the population being studied is more or less susceptible than the population as a whole. Cancer risk coefficients from human data are typically considered best estimates and are applied without safety factors. Cancer risk is typically considered proportional to pollutant concentration at any level of exposure (i.e., a linear, no-threshold model), which is conservative at low environmental doses. For non-cancer effects, the lowest exposure known to cause effects in humans is usually divided by uncertainty or safety factors to account for variations in susceptibility and other factors. When toxicity estimates are derived from animal data, they usually involve extra safety factors to account for possibly greater sensitivity in humans, and the less-than-human-lifetime observations in animals. Overall, the toxicity assumptions and criteria used in the proposed SSU6 Project's risk assessment are biased toward overestimating risk. The amount of the bias is unknown, but could be substantial.

5.15.2.1.2 Air Toxics – Construction Phase

The construction phase of the SSU6 Project is expected to take 20 months. Strict construction practices that incorporate safety and compliance with all applicable laws, ordinances, regulations, and standards (LORS) will be followed (see Sections 5.16.6 and 5.1.5). Further, mitigation measures to reduce airborne construction impacts will be implemented as described in Section 5.1.4.

As the construction phase of the SSU6 Project is expected to last just 20 months, only an acute health risk analysis was conducted. Air toxics will be emitted from well testing and the diesel equipment used for general construction and well drilling. The short-term diesel construction equipment emission rate was determined from the month with the maximum emissions, then calculated as an hourly rate based on a 20 day working month and an eight-hour work day. For modeling purposes, the diesel construction equipment were assumed to be situated at four locations to spread out the emissions over the plant site as would be expected during construction. It is anticipated that a maximum of three drill rigs may be drilling wells for the SSU6 Project at any given time. For modeling purposes, three different well sites were chosen, one within the primary plant site boundary and two outside the plant boundary. These wells were chosen to add more conservatism to the modeling such that the impacts of the other construction emissions may add to the well drilling emissions, thus worsening the predicted hazard risk. In addition no more than one well test of either a production or injection well may occur at any given time during construction. In the construction analysis one production well test, which will be vented to the production test unit, was examined as it had higher air toxics emissions than the injection well testing. Table 5.15-4 identifies the location for each source of the construction phase of the SSU6 Project, and the stack parameters used in the ISCST3 modeling.

Table 5.15-5 presents the emission rates used for each of the modeled air toxics for each source, these values were used as the input into the ACE2588 model. Emissions of air toxics for the worst 12-month period during the construction phase are presented in Tables G-2, G-3.5 and G-4 in Appendix G. The duration of the construction activities will be too short to produce chronic (cancer or non-cancer) health impacts.

Construction Results

The acute hazard index was predicted to be 0.4917 at the point of maximum impact (PMI). The maximum acute hazard index predicted at a sensitive receptor, also referred to as the maximum exposed individual (MEI), was 0.2469. Acute exposures were based on the highest predicted one-hour average concentration. Predicted acute impacts from the construction phase at all receptors are below the significance criteria of 1.0. The construction phase of the project should have insignificant acute non-cancer health effects on the surrounding community based on the regulatory guidelines.

5.15.2.1.3 Air Toxics – Commissioning

Plant commissioning is expected to last for approximately 14 days, therefore only acute health risks are analyzed. During plant commissioning, nine wells are proposed to be started. As each well is being warmed-up, the flow will be directed to the Production Test Unit (PTU). After the warmup period, the flow will be routed through the plant lines and steam generated will be vented at the steam vent tanks and the dilution water heaters. After all wells have been started a sequence of high, standard and low pressure steam blows will be conducted, each venting to a designated steam line next to the turbine housing along with venting through the steam vent tanks and dilution water heaters. Following the steam blows, the turbine preheat and other various test will occur.

For modeling purposes, several scenarios were examined to ensure the worst one-hour period was considered. Scenario 1 consists of flow from one of the wells being directed to the PTU and flow from seven wells directed through the steam vent tanks and the dilution water heaters. Scenario 2 consists of flow from all nine wells being directed through the steam vent tanks and the dilution water heaters. In Scenario 3, the steam blow scenario, some of the steam will be routed through the steam vent tanks and the dilution water heaters and some through one of the high, standard or low pressure steam lines, depending on the pressure of the initial steam. Further details of the commissioning process can be found in Section 5.1.2.2.5.

Table 5.15-6 presents the commissioning emission rates used for each of the air toxics emitted from each source for each scenario; these values were used as the input into the ACE2588 model. The maximum expected emissions for the entire commissioning period can be found in Table G-5 in Appendix G. Table 5.15-7 identifies the location for each source associated with commissioning and the stack parameters used in the each of the ISCST3 modeling scenarios.

Commissioning Results

The acute hazard index for Scenario 1 was predicted to be 2.027 at the point of maximum impact at the peak of Obsidian Butte. The maximum acute hazard index predicted at a sensitive receptor, the MEI, was 0.967. For Scenario 2, the acute hazard index at the point of impact was predicted to be 1.564, and 0.787 at the nearest sensitive receptor. The predicted acute hazard indices for Scenarios 3a, b, and c were 3.715, 1.542, and 1.558 respectively for the point of maximum impact. The acute hazard indices at the nearest sensitive receptors were predicted to be 1.109, 0.834, and 0.7982 for Scenarios 3a, b, and c, respectively. Therefore, the worst combination of equipment for Scenario 3, a steam blow, involved the operation of a high-pressure steam blow. Figures 5.15-3, 5.15-4 and 5.15-5 show the acute hazard index isopleths for each of the three commissioning scenarios modeled for the SSU6 Project. Figure 5.15-5 depicts the isopleths from Scenario 3a.

For Scenarios 1, 2, 3b and 3c the predicted acute health indices at all sensitive receptors are below the significance criteria of 1.0. For Scenario 3a, a high-pressure steam blow, the maximum acute health index was predicted to be slightly above the significance criteria of 1.0 at the nearest sensitive receptor. This Scenario is expected to only occur once during the lifetime of the plant for a maximum of 24 hours, and for the worst impacts to occur, the wind would have to be blowing toward the sensitive receptor for the entire hour. For all scenarios, except 3a, predictions of the acute hazard index greater than the criteria occur close to the plant site, in an area with no sensitive receptors, no population and infrequent use. The commissioning phase of the SSU6 Project is expected to occur once for at most 14 days, minimizing the possibility of the having the same meteorological conditions that predicted worst-case impacts in the modeling occurring at the same time as the actual commissioning. Thus, the commissioning phase of the SSU6 Project should not have significant acute non-cancer health effects on the surrounding community.

5.15.2.1.4 Air Toxics - Routine Operations

Consistent with modeling performed for criteria pollutants (Section 5.1.2.3), annual emissions were calculated assuming 8,760 hours per year of operations for the SSU6 turbine and ancillary equipment, 2,920 hours for the filter processing, 200 hours each for the two emergency generators and fire pump, and between 156 to 384 hours for the operations and maintenance diesel equipment. These assumed operating hours were used to calculate the annual average emissions of toxic substances, and then used in the calculations of carcinogenic and chronic non-cancer health effects. For evaluation of acute non-cancer health impacts, maximum full-load emissions were assumed for all equipment for the full hour. Emission rates used in the ACE2588 model for specific project sources are summarized in Tables 5.15-8 and 5.15-9. Source locations and stack parameters used in ISCST3 are summarized in Table 5.15-10.

Most of the air toxic emissions will come from the cooling towers. The emissions of air toxics from the cooling towers were estimated based on brine quality data and the implementation of various abatement systems. The cooling towers will have emissions from noncondensible gases, condensate, and drift.

The noncondensible hydrogen sulfide will be abated using a LO-CAT System, which will reduce it by 99.5 percent. The LO-CAT System is a liquid reduction-oxidation process that uses a chelated iron solution to convert hydrogen sulfide to elemental sulfur. The system employs a non-toxic iron catalyst to assist in the reaction between hydrogen sulfide and oxygen. The adsorber and oxidizer areas are contained in one vessel and separated by baffles. Noncondensible gases enter the adsorber section of the unit and the oxidized iron solution converts the hydrogen sulfide to elemental sulfur. The reduced iron solution circulates to the oxidizer area where it is contacted with air and reoxidized and available to convert more hydrogen sulfide.

The condensate that contains some of the dissolved gases is sent to two oxidizers at the most northern cell of each of the cooling towers. The oxidizers operate as a liquid bioreactor by using naturally occurring bacteria (thiobacilli) to oxidize the hydrogen sulfide to elemental sulfur or sulfate ion. In practice, these oxidizers have reduced hydrogen sulfide concentration levels down to nondetectable levels in cooling tower exhaust. The Applicant is proposing a hydrogen sulfide permitting control level of 95 percent for the SSU6 Project. Other partition gases are not affected by the oxidizer. After the oxidizer, the condensate is routed through the cooling towers where the remaining noncondensible gases can be stripped or offgassed.

After the LO-CAT System, the air stream is pumped over to a series of carbon adsorbers for the control of benzene. This is the first time that carbon adsorbers have been used for the control of benzene in geothermal facilities. Pilot testing has been conducted and has indicated excellent results for benzene; based on these results, the Applicant is proposing 95 percent control for benzene. While it can be expected that similar organic noncondensible gases will also be controlled, because no testing of these gases has been conducted, no control assumptions will be made in this analysis. Arsenic in the noncondensible gas stream is anticipated to be reduced by 90 percent collectively by the two systems. After the carbon adsorbers, the noncondensible gases are conveyed to each of the 20 cells at the cooling tower and equally released.

The cooling towers use the condensate for cooling tower makeup. Substances present in the condensate, such as particulates and trace metals, can be contained in the drift of the cooling tower. Drift is the entrained cooling water carried from the cooling tower by the exhaust air. The design control drift efficiency is 0.0006 percent.

Mercury emissions will also be reduced by this series of systems.

The emissions of radon from the cooling towers were estimated based on measured radiological characteristics of the feed water and the brine. While the use of carbon adsorbers is expected to abate the radon concentrated in the cooling tower, no control credit was conservatively assumed in the analysis. Radon may be emitted from the storage of the filter cake. The filter cake is mostly composed of an amorphous silicate with varying amounts of heavy metals. Sulfate scale inhibitors utilized at the facility have a secondary benefit of reducing radium levels to below 10 pCi/gram. Uninhibited filter cake ranges from 10 pCi/gram to approximately 250 pCi/gram of Ra226. The typical radium concentration in soil is 1 pCi/gram, and in general ranges from 0.3 to 5.4 pCi/gram (ASTM 1994). The silica filter cake media will be loaded into the removal trucks, which will be tarped to reduce fugitive emissions. The trucks may remain at the plant for up to five days pending results of analyses to ensure the material is removed to the appropriate disposal facility. Traces of radon can potentially be emitted from the stored filter cake. Salton Sea filter cake samples from a neighboring geothermal power plant were analyzed to determine radon gas diffusion and emanation properties. A discussion of the emission rate calculation for the filter cake can be found in Appendix N.

Another relatively large source of air toxics from routine operations are the various diesel equipment. Particulate matter from diesel exhaust is considered an air toxic in California. All diesel equipment will be run on low sulfur fuel (less than 0.05 percent sulfur content by weight) and particulate filters will further reduce the PM_{10} emissions by 90 percent. A detailed description of the mitigation measures to reduce impacts from airborne particulates is provided in Section 5.1.4-Air Quality Mitigation Measures.

No hexavalent chromium will be added to the circulating water in the cooling towers; further, it was conservatively assumed that all naturally occurring trivalent chromium present in the brine would be hexavalent chromium, which has a very high cancer unit risk factor.

Routine Operations Results

The models ISCST3 and ACE2588 were run to predict the maximum cancer risk, as well as the maximum chronic and acute hazard indices. The maximum incremental lifetime cancer risk was calculated to be approximately 2.88 in one million at the point of maximum impact (PMI), approximately 0.3 miles east of the plant site boundary. The highest cancer risk at a sensitive receptor was predicted to be 1.072 in one million; this maximally exposed individual (MEI), was predicted to be 2.1 miles east of the plant (See Figure 5.15-6). The highest cancer risk, and the highest chronic and acute hazard indices predicted for a sensitive receptor occurred at the same location, the residence 2.1 miles to the east of the plant. Figure 5.15-6 shows the cancer risk isopleths for routine operations at the SSU6 Project. Because the cancer risk was predicted to be below the health significance criteria of 10 in one million at all receptors, insignificant cancer impacts are expected in the surrounding area and no further mitigation is required.

The chronic hazard index predicted to occur at the PMI was 0.156, as shown in Figure 5.15-7, and the maximum chronic hazard index at a sensitive receptor, the MEI, was 0.0604. For assessing chronic non-cancer health effects, calculated exposures were based on annual-average dispersion modeling results. The maximum acute hazard index was predicted to be 0.881, on the eastern property boundary, as shown in Figure 5.15-8. The maximum acute hazard index predicted at a sensitive receptor, the MEI, was 0.310. Acute exposures were based on the highest predicted one-hour average concentration. Predicted chronic and acute impacts at all receptors are below the significance criteria of 1.0; thus the SSU6 Project is expected to have insignificant non-cancer health effects based on regulatory guidelines.

5.15.2.1.5 Air Toxics - Temporary Operations

Temporary operations that could be expected to occur at SSU6 include a well startup/flow test following each clean-out or re-drill activity, a plant startup/brine handing upset, or a turbine trip, all of which are separate events. All temporary operations are unscheduled events that last for a matter of hours; therefore, only acute health risks are assessed.

Three modeling scenarios were considered. Scenario 1 a well startup/flow test consists of testing either a production or injection well. Preliminary screening showed that an injection well test produced higher impacts than a production well test, thus only emissions from an injection well were examined. The injection well test emissions will be vented through a portable unit at the well site. Well startup tests are expected to occur at most 232 hours per year for the production wells and 54 hours for the injection wells.

Scenario 2 examines the situation when the turbine is tripped and the turbine cannot receive the steam generated. When this happens all of the steam normally sent to the turbine is routed to the low and standard pressure steam vent tanks, with the flow intended for the high pressure steam vent tank redirected through the emission control systems then to the cooling towers and the dilution water heaters. This system is also used for warm plant startups and shutdowns. It is expected that up to six turbine trips may occur in a year, each lasting for less than two hours, for a maximum of 50 hours.

Scenario 3 examines a cold plant startup event. It is expected that at most one such event would occur in a year, and could last up to 45 hours. As the plant starts up, each well will be routed to the PTU for warmup. Once the well has warmed up, the flow will be directed to the low and standard pressure vent tanks with the flow intended for the high-pressure steam vent tank redirected through the emission control systems, then to the cooling towers and dilution water heaters. As each subsequent well is started, the flow will initially pass through the PTU, then be added to the flow of previously started wells. Preliminary screening identified the worst-case scenario to have flow from one well warmed up and a second well warming up in the PTU.

Well reworking or re-drilling, is expected to occur at most once every two years. During these operations, emissions may occur from well cleanout or re-drill activities. Because the emissions associated with diesel equipment do not cause acute health impacts, well re-drilling impacts was not examined, also well testing emission are already considered in Scenario 1 described above, thus this scenario was not modeled separately.

As the three scenarios described above all occur for short durations, only acute health risks are analyzed. For modeling purposes, the worst one-hour period for each scenario was examined. Further details regarding the temporary operations can be found in Section 5.1.2.4-Potential Temporary Emissions.

Table 5.15-11 presents the estimated temporary operations emission rates for individual air toxics emitted for each scenario. These values were used as the input into the ACE2588 model. Estimated annual emission rates can be found in Tables G-2, G-14, G-15, and G-16 of Appendix G. Table 5.15-12 identifies the location for each source and the stack parameters used in the ISCST3 modeling.

Temporary Operations Results

For Scenario 1, during an injection well test, the maximum acute hazard index was predicted to be 0.8726 at the PMI and the acute hazard index at the nearest resident was 0.3745. For Scenarios 2 and 3 the maximum acute hazard indices were predicted to be 0.8863 and 0.5579 respectively, and the acute hazard indices predicted at the nearest resident were 0.3151 and 0.3028 respectively. The acute hazard indices predicted at all of the receptors are below the significance criteria of 1.0. Thus, the temporary operations of the SSU6 Project are expected to have insignificant acute non-cancer health effects on the surrounding community.

5.15.2.2 Radionuclides

Radioactive materials, such as radium, potassium-40, uranium, thorium, and their radioactive decay products are present in underground formations from which geothermal fluids are extracted. Uranium and thorium are highly insoluble. However, radium is slightly soluble and may be brought to the surface and deposited with scale or sludge that precipitates onto the inside surfaces of production equipment. Radioactive materials are also concentrated in filter cake media. The concentrations of radioactive materials in geothermal waste vary with the physical and chemical changes that take place during energy extraction.

As radium in geothermal wastes decays, radon gas is generated. Inhalation of radon gas is carcinogenic, affecting the respiratory system. When the radon gas escapes the confines of the waste matrix, local winds can cause it to migrate downwind. Because radon is only generated when radioactive material is brought to the surface through geothermal fluid extraction, and radon requires a long exposure to cause impacts, radon exposures assessments were only evaluated for activities associated with the temporary storage of the filter cake and emissions from the cooling tower during routine operations. Although there are short-term emissions of radon from the steam vent tanks and PTU during plant commissioning, and temporary well flow testing, these are not examined, as there are no acute health risks associated with radon.

5.15.2.2.1 Supplemental Radionuclide Analysis

The CAP88 Clean Air Act Package model (Parks 1997) was used to validate and verify the atmospheric dispersion estimated by the ISCST3 model and documented below. The CAP88 Model is a set of computer programs, databases, and associated utility programs for estimation of dose and risk from radionuclide emission to air. CAP88 is composed of modified versions of AIRDOS-EPA and DARTAB and is based on a modified Gaussian plume approach to atmospheric transport. The CAP88 model was designed for use at U.S. Department of Energy (DOE) facilities to demonstrate compliance with US EPA standards under 40 CFR 61.

CAP88 is used to estimate the average dispersion of radionuclides released from up to six emitting sources. The sources may be either elevated stacks or uniform area sources. Plume rise can be calculated assuming either a momentum or buoyant-driven plume.

CAP88 is designed within a cylindrical coordinate system with the ability to model population distributions and atmospheric variabilities that fall within the Pasquill approximations (Pasquill 1961). However, it does not have the ability to model the effects of detailed terrain features, building wakes, or periodic washout as does the detailed ISCST3 model. Because of the absense of these effects in its analysis, CAP88 has generally been found to provide conservative upper bounds to atmospheric transport.

CAP88 uses organs and weighting factors consistent with the ICRP 26/30 Effective Dose Equivalent Calculations. The calculation of deposition velocity, the scavenging coefficient, and the dose and risk conversion factors incorporated are consistent with current EPA policy (US EPA 1998).

As validation, two CAP88 datasets were created and analyzed, both modeling only Radon-222 as their sources. While ISCST3 will model numerous discrete sources, CAP88 only allows for 6, with restrictions on location specification and type of source. Because of this, two separate CAP88 model runs were conducted for the cooling tower and filter cake storage sources. One hypothetical cooling tower with 6 cells was modeled to represent the two cooling towers with 20 cells. The only parameter changed for the hypothetical cooling tower is the diameter of each of the 6 cells at 17.8m instead of 9.75m for each of the 20 cells in the two towers. Details about the sources and emission rates used with both models can be found in Section 5.15.2.1.4. Because of the limited receptor capacity of CAP88, the model was run only for the maximally exposed indivudual (MEI), the sensitive receptor 2.1 miles east of the SSU6 Project. The same radon emission rates that were used in the ACE2588 model were used in the CAP88 model.

The maximum concentration per unit emission rate (χ/Q) values that CAP88 predicted for the distance representive of the sensitive receptor, along with the χ/Q values predicted by ISCST3 for the same receptor are summarized in the table below. The CAP88 input and output files will be submitted on CD-ROM to the CEC and the ICAPCD separately.

Source	ISCST3	CAP88	Comparison
Cooling Tower	1.35×10^{-7}	1.60×10^{-8}	CAP88 88% Lower
Filter Cake	1.01×10^{-6}	1.12×10^{-6}	CAP88 11% Higher

The main difference between the dispersion algorithms of the two models is a more refined treatment of varying terrain and building-wake effects. The cancer risk predicted by ISCST3 at this sensitive receptor resulting from radon inhalation alone is 0.428 in one million for the cooling tower and very small (2.89×10^{-4} cancers in one million) for the filter cake storage. The CAP88 modeling confirmed that the predictions from ISCST3 and ultimately ACE2588 projected impacts from the radionuclides are within the expected range of uncertainty for these given models.

5.15.2.3 Criteria Pollutants

For each of the operational scenarios described above, six criteria pollutants were modeled and evaluated for their impacts on air quality and human health (see Section 5.1). Modeling of nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10}), hydrogen sulfide (H_2S), and lead (Pb), during routine operations indicates that health impacts of criteria pollutants are not significant (Section 5.1.2). Maximum predicted concentrations of the criteria pollutants were compared with the National and California Ambient Air Quality Standards (NAAQS/CAAQS), which are health-based levels that serve as inhalation reference doses. Except for PM_{10}, which already exceeds the CAAQS and NAAQS, the other criteria pollutants for routine operations were below the Standards. However, concentrations of PM_{10} are below the Prevention of Significant Deterioration (PSD) significant impact levels and therefore, adverse health effects are not anticipated.

Temporary emissions from construction related activities, commissioning, and temporary operations are discussed in Sections 5.1.2.2, 5.1.2.2.5, and 5.1.2.4 respectively. Ambient air modeling for PM_{10}, CO, SO_2, NO_x, H_2S and Pb was performed as described in Sections 5.1.2.5.5 and 5.1.2.5.7, and the results are summarized in Section 5.1.2.6. Short-term ground level concentrations of PM_{10}, $NO_{x,}$ and H_2S are predicted to be above state standards during construction activities, and during commissioning operations for H_2S. Emissions from the construction related activities, and commissioning operations are temporary and localized, resulting in no long-term impacts to the public.

5.15.2.4 Electromagnetic Field Exposure

Exposure to both electric and magnetic fields (EMFs) occurs where electric charges exist. Electric fields exist when these charges are not moving. Magnetic fields are created when the electric charges are moving. The magnitude of both electric and magnetic fields decrease rapidly as the distance from the source increases.

Transmission lines, distribution lines, house wiring, and appliances generate electric fields in their vicinity because of unbalanced electrical charge on unshielded energized conductors. Electric field strengths are expressed in volts per meter (V/m) or kilovolts (thousands of volts) per meter (kV/m).

Once electric currents are in motion, they create magnetic fields. The strength of the magnetic field is proportional to the magnitude of the current in the circuit. Magnetic fields can be characterized by the force they exert on a moving charge or on an electrical current. A magnetic field is a vector quantity that is characterized by both magnitude and direction. Electric currents are sources of magnetic fields. Magnetic field strengths are measured in milligauss (mG).

At the ground under a transmission line, the electric field is nearly constant in magnitude and direction over distances of a few meters. However, in proximity to the transmission or distribution line conductors, the field decreases rapidly with increasing distance from the conductor. Similarly, near small sources such as appliances, the field is not uniform and falls off even more rapidly with distance from the device. If an energized conductor is inside a grounded conducting enclosure, the electric field outside the enclosure is zero and the source is said to be shielded.

Concern about health effects from EMFs arose in 1979 when researchers calculated a weak statistical link between proximity to power lines and childhood leukemia. This study was based on wire-code classifications for residences and the incidence of leukemia. Since then, other researchers have investigated this potential association and other types of potential human health effects from EMFs.

In January 1991, the California Public Utility Commission (CPUC) issued an Order Instituting Investigation (CPUC 1991) into the potential health effects from electric and magnetic fields emitted by electric power and cellular telephone facilities. In September 1991, the assigned CPUC Administrative Law judge issued a ruling that created the “California EMF Consensus Group.” This group of representatives from utilities, industry, government, private and public research, and labor organizations submitted a document entitled "Issues and Recommendations for Interim Response and Policy Regarding Power Frequency EMFs" on March 20, 1992 (California EMF Consensus Group 1992). Regarding the relevant policy consensus recommendation titled "Facility Siting," the group stated that the CPUC should recommend that utilities take public concern about electromagnetic fields into account when siting new electric facilities. Although this group could not conclude that there is a relationship between EMF and human health effects, they also could not conclude that this relationship does not exist to any extent; therefore, they recommended that the CPUC authorize further research.

In 1991, Congress asked the National Academy of Sciences (NAS) to review the research literature on the effects of EMF exposure and determine whether a sufficient scientific basis existed to assess health risks from such exposure. In response, the National Research Council (NRC) convened the Committee on the Possible Effects of Electromagnetic Fields on Biologic Systems. After examining more than 500 studies spanning 17 years of research, the committee concluded in an October 1996 report that there is no conclusive evidence that EMFs play a role in the development of cancer, reproductive and developmental abnormalities, or learning and behavioral problems (NRC 1996).

On June 27, 1998, a 28-member advisory panel sponsored by the National Institute of Environmental Health Science (NIEHS), part of the National Institutes of Health, voted 19 to 9 to label EMFs a "possible human carcinogen," which kept open funding for continuing government studies. On May 4, 1999, NIEHS issued a report entitled Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields (NIEHS 1999). This report found that the evidence is "weak" that electric and magnetic fields cause cancer. The report concludes: "The NIEHS believes that the probability that EMF exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal scientific support that exposure to this agent is causing any degree of harm." While the report says EMF exposure "cannot be recognized as entirely safe," the report goes on to say, "… the conclusion of the report is insufficient to warrant aggressive regulatory action." Because virtually everyone in the United States is exposed to EMF, the report recommends that "… passive regulatory action is warranted such as continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures," but that cancer and non-cancer health outcomes do not provide "… sufficient evidence of a risk to warrant current concern."

The most recent study, published in April 2001 by the California Department of Health Services suggests a possible correlational, (not causational link) between EMFs and several human health effects. For this study, no new data was collected and the reviewers used the results of many previous studies on the cumulative effects of EMFs on humans and animals to arrive at their conclusions (California Department of Health Services 2001). Though the results of this study suggest a stronger correlation between various human health effects and EMFs, the researcher acknowledges in their conclusions that "there is a chance that EMFs have no effect at all."

5.15.2.4.1 Project Impacts

Power lines, electrical wiring, electrical machinery, and appliances all produce electric and magnetic fields, commonly referred to as EMFs. The electric and magnetic fields produced by the SSU6 project power system would have a frequency of 60 Hz, meaning that the intensity and orientation of the field changes 60 times per second. This section addresses the estimates of the maximum possible electric and magnetic field strengths that will be produced by the SSU6 transmission facilities. These estimates are computed for a height of 1 meter above the ground, and include the canceling effects of other electrical transmission lines existing along the proposed transmission line right of way.

When a conductor is energized, an electric field is formed around the conductor that is proportional to the energization voltage. The strength of the electric field is independent of the current flowing in the conductor. When alternating current (AC) flows through a conductor, an alternating magnetic field is created around the conductor. Overhead AC transmission lines carry power over three conductors with currents and voltages that are 120 degrees out of phase with each other. The fields from these conductors tend to cancel out because of the phase difference. However, when a person stands on the right-of-way under a transmission line, one conductor is always significantly closer and will contribute a net uncanceled field at the person's location. The strength of the magnetic field depends on the current in the conductor, the geometry of the structures, the degree of cancellation from other conductors, and the distance of the receptor from the conductors.

To estimate the maximum fields, calculations were performed at mid-span where the conductor would be positioned at its lowest point between structures (the estimated maximum sag point). The magnetic fields were computed at 1 meter above ground. EPRI's ENVIRO Workstation was used to calculate the magnetic field strengths for four different potential transmission line configurations. This program and others like it have been used to predict electric and magnetic field levels that have been confirmed by field measurements by numerous utilities.

To understand levels of EMFs that the project would generate, magnetic field strengths were also calculated at the edges of the proposed right-of-way, for each transmission line configuration scenario. These calculations are discussed further in Appendix L, EMF Study. The magnetic field generated at the edge of the right-of-way for the fifth configuration, along which no residents are located, is 19.8 milligauss (mG). The greatest magnetic field strength calculated at the edge of the right of way 150 feet from the centerline of a configuration in which residents are located adjacent to the right-of-way is approximately 8.3 mG on average. This magnetic field strength is equivalent to the magnetic field produced by a color television that is experienced by an observer sitting 9 inches from the TV (Lee 1996).

Calculated electric and magnetic field strengths for the proposed transmission lines are consistent with typical EMFs produced by similarly rated transmission lines (Lee 1996). EMFs generated by the project at the edges of the right-of-ways would be comparable to EMFs generated by commonly used household appliances and would not be considered a significant impact to public health.

5.15.2.5 Summary of Public Health Risk Impacts

Results from the air toxics risk assessment based on emissions modeling indicate that there would be no significant incremental public health risks from the construction, commissioning, routine operations or temporary operations of the SSU6 Project to the surrounding community. Results from criteria pollutant modeling for routine operations indicate that potential ambient concentrations of NO_2, CO, SO_2, PM_{10}, H_2S and Pb meet federal requirements that have been established to protect public health, including the more sensitive members of the population. Although concentrations of PM_{10} and NO_2 may be temporarily higher than the state and federal standards during construction, these emissions should occur for at most 20 months. Additionally, the predicted H_2S concentrations for the construction and commissioning operations are higher than the state standard, resulting in localized short-term impacts to the public. Based on the results of the health risk assessment, these impacts to public health would not be significant. EMF-related impact to public health would also not be significant.

5.15.3 Cumulative Impacts

The projects included in the cumulative impacts analysis are presented in Section 5.17. When toxic air contaminants are emitted from multiple sources within a given area, the cumulative or additive impacts could potentially lead to health impacts within the population, even when such pollutants are emitted at low levels and are localized within relatively short distances from the source. This is true when said sources are adjacent to one another.

Within 3 miles of the SSU6 Project, there are nine existing geothermal power plants, all less than 50 MW, and a mineral processing plant. The remaining lands are used for agriculture and the Refuge.

A cumulative assessment should be conducted if other sources fall within the zone of impact, an area with impacts predicted above one of the health criteria, from the proposed project. Because there are no impacts predicted above any of the health criteria during routine operations, no cumulative analysis need be considered.

5.15.4 Mitigation Measures

The proposed project has been designed to minimize potential public health risks, including the incorporation of appropriate emission control measures as discussed above in the sections describing each operational phase and in Section 5.1.4. Based on the results of the air toxics risk assessment, no additional mitigation measures are required to reduce risks, as all risk estimates are within acceptable levels. Because electric and magnetic field strengths are expected to be within normal background levels, no additional mitigation measures are required.

5.15.5 Applicable Laws, Ordinances, Regulations, and Standards

Applicable public health LORS are summarized in Table 5.15-13 and described below. Agency contacts are provided in Table 5.15-14.

5.15.5.1 Federal Authorities and Administering Agencies

The US EPA implements and enforces the requirements of many of the federal environmental laws. US EPA Region IX, which has its offices in San Francisco, administers US EPA programs in California.

The federal CAA, as most recently amended in 1990, provides US EPA with the legal authority to regulate hazardous or toxic air pollution from stationary sources such as the SSU6 Project. The US EPA has promulgated the National Emission Standards for Hazardous Air Pollutants program for stationary sources to implement the requirements of the CAA.

National Emission Standards for Hazardous Air Pollutants: Clean Air Act §112, 42 USC §7401 et seq.; 40 CFR Part 63. Establishes national emission standards to limit hazardous air pollutants (HAPs), which are air pollutants identified by US EPA as causing or contributing to adverse human health effects of air pollution, but for which NAAQS have not been established. The NESHAPs program also requires the application of maximum achievable control technology (MACT) to any new or reconstructed major source of HAP emissions among a list of designated industry and process categories to minimize those emissions. The HAPs emissions threshold for a major source is 10 tons per year (tpy) for a single HAP and 25 tpy for a combination of HAPs. SSU6 is not considered a major source for HAPs, as the combined HAP emissions are expected to be less than 1 tpy.

The only NESHAP that applies to SSU6 is for Industrial Process Cooling Towers. This standard will be met, as no chromium will be added to the circulation water for the cooling towers. Therefore, the SSU6 Project will comply with the applicable requirements of the NESHAPS program.

The administering agency is the Imperial County Air Pollution Control District (ICAPCD), with US EPA Region IX oversight.

Toxic Chemical Release Inventory Program: Emergency Planning and Community Right-to-Know Act (EPCRA) § 313. Under the EPCRA, certain facilities and establishments must report toxic releases to the environment if they:

- Manufacture more than 25,000 pounds of a listed chemical per year
- Process more than 25,000 pounds of a listed chemical per year
- Otherwise, use more than 10,000 pounds of a listed chemical per year.

This program is commonly referred to as the Toxic Chemical Release Inventory (TRI). As applied to electric utilities, only those facilities in Standard Industrial Classification (SIC) Codes 4911, 4931, and 4939 that combust coal and/or oil for the purpose of generating electricity for distribution in commerce must report under this regulation. The SSU6 falls under SIC Code 4911, which covers establishments engaged in the generation, transmission, and/or distribution of electric energy for sale. However, the proposed project will not combust coal and/or oil for the purpose of generating electricity for distribution in commerce. Accordingly, this program does not apply to the SSU6, and will not be addressed further.

The administering agency is US EPA Region IX.

5.15.5.2 State Authorities and Administering Agencies

The CARB was created in 1968 by the Mulford-Carrell Air Resources Act, through the merger of two other state agencies. CARB's primary responsibilities are to develop, adopt, implement, and enforce the state's motor vehicle pollution control program; to administer and coordinate the state's air pollution research program; to adopt and update, as necessary, the state's ambient air quality standards (AAQS); to review the operations of the local Air Pollution Control Districts (APCDs); and to review and coordinate preparation of the State Implementation Plan (SIP) for achievement of the NAAQS.

California Clean Air Act, Toxic Air Contaminant (TAC) Program: California Health & Safety Code §39650 – 39675. Established in 1983, the Toxic Air Contaminant Identification and Control Act created a two-step process to identify TACs and control their emissions. CARB identifies and prioritizes the pollutants to be considered for identification as TACs. CARB assesses the potential for human exposure to a substance while the OEHHA evaluates the corresponding health effects. Both agencies collaborate in the preparation of a risk assessment report that concludes whether a substance poses a significant health risk and should be identified as a TAC. In 1993, the State Legislature amended the program to identify the 189 federal hazardous air pollutants as TACs. CARB reviews the emission sources of an identified TAC and develops, if necessary, air toxics control measures (ATCMs) to reduce the emissions. As discussed in Sections 5.15.2.1.2, 5.15.2.1.3, 5.15.2.1.4 and 5.15.2.1.5 the proposed project's health risk impacts are below regulatory threshold levels at all sensitive receptors and above the regulatory threshold levels in uninhabited, infrequently used areas near the plant. Section 5.15.2.1.1 discusses the quantitative health risk assessment that was completed to address this requirement.

The administering agency is the ICAPCD, with CARB oversight.

Air Toxic "Hot Spots" Act: California Health & Safety Code §44300-44384; 17 CCR §93300-93347. Established in 1987, the Air Toxics "Hot Spots" Information and Assessment Act supplements the TAC program, by requiring the development of a statewide inventory of TAC emissions from stationary sources. The program requires affected facilities to prepare (1) an emissions inventory plan that identifies relevant TACs and sources of TAC emissions; (2) an emissions inventory report quantifying TAC emissions; and (3) a health risk assessment, if necessary, to characterize the health risks to the exposed public. Facilities whose TAC emissions are deemed to pose a significant health risk must issue notices to the exposed population. In 1992, the State Legislature amended the program to further require facilities whose TAC emissions are deemed to pose a significant health risk to implement risk management plans to reduce the associated health risks. Section 5.15.2 addresses the health risk analyses conducted for the SSU6 Project to demonstrate that the facility will not cause adverse health impacts to the surrounding community.

The administering agency is the ICAPCD, with CARB oversight.

As discussed in Sections 5.1.2 and 5.15.2, compliance with this code would be met through the health risk assessment and through operational compliance measures.

Public Nuisance California Health & Safety Code § 41700. This general provision of the Code prohibits the discharge from any facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public; or which endanger the comfort, repose, health, or safety of the public; or that damage business or property.

The administering agency is the ICAPCD, with CARB oversight.

Although concentrations of hydrogen sulfide exceed the state air quality standard during the short-term construction, commissioning and temporary operations, the odor threshold (1 ppm) may only be reached during a plant start up. Moreover, concentrations predicted during these operations are well below the California Occupational Safety and Health Administration's permissible exposure limit of 10 ppm. Based on the installation of T-BACT and the results of the air toxics modeling analysis, the SSU6 Project should not cause a public nuisance.

California Health & Safety Code, §25500 to 25541; 19 CCR §§2720-2734. To protect workers and the public from an accidental release of a hazardous material, this code requires a business plan describing the proposed emergency responses to a release or threatened release of hazardous material or mixture. Prior to the storage of hazardous materials on site, the SSU6 will prepare a Hazardous Material Business Plan, this is outlined in Section 5.14.2 Hazardous Materials Handling.

The administering agency is the Imperial County Public Health Department Environmental Health Services Division.

CEC and CARB Memorandum of Understanding: California Public Resource Code §25523(a); 20 CCR §1752, 1752.5, 2300-2309, and Division 2, Chapter 5, Article 1, Appendix B, Part (k). This section of the California Code as it applies to the SSU6 establishes requirements in the CEC's power plant review and decision-making process that assures that protection of environmental quality is fully considered in any power plant AFC. The Applicant has prepared this AFC, which demonstrates the protection of environmental quality.

The administering agency is the CEC.

The SSU6 would comply with this code through the CEC process.

5.15.5.3 Local Authorities and Administering Agencies

When the state's air pollution statutes were reorganized in the mid-1960s, local APCDs were required to be established in each county of the state.

The ICAPCD has been delegated responsibility for implementing local, state, and federal hazardous and toxic air quality regulations in the SSU6 Project area.

Applicable ICAPCD Rules. The following discussion presents a brief description of the ICAPCD rules and regulations that are applicable for the hazardous and toxic air pollutants that will be emitted by the proposed project.

Regulation II. Rule 216. Construction or Reconstruction of Major Stationary Sources that Emit Hazardous Air Pollutants. An applicant shall apply Best Available Control Technology for Toxics (T-BACT) to any constructed or reconstructed major source. A major source of HAPs is any stationary source or group of stationary sources within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of hazardous air pollutants or 25 tons per year or more of any combination of hazardous air pollutants. It is expected that for routine operations the SSU6 Project will emit less than 1 ton per year of HAPs. Therefore, T-BACT will not need to be applied to any sources at the SSU6 Project.

Regulation X. Rule 1001. National Emission Standards for Hazardous Air Pollutants. The Federal NESHAPS of 40 CFR Part 63 are incorporated as part of the Rules and Regulations of the Imperial County Air Pollution Control District. Applicable provisions of 40 CFR Part 63 include those incorporated in the current bound CFR volume plus any provisions recently promulgated by U.S. EPA, as noticed in the Federal Register, but not yet incorporated into the bound CFR.

At SSU6 the HAP emissions for the project are below the major source thresholds of 10 tons per year (tpy) for a single HAP and 25 tpy for a combination of HAPs, as the total HAP emissions are expected to be 1 tpy. Thus, this rule does not apply to the SSU6 Project.

Regulation X. Rule 1002. California Airborne Toxic Control Measures. Incorporation of California Standards. The provisions as contained in the California Code of Regulations, are incorporated as part of the Rules and Regulations of the Imperial County Air Pollution Control District. None of the regulated processes is used at SSU6; thus, none of the listed control measures needs to be applied and this rule does not apply to the SSU6 Project.

Regulation X. Rule 1003. Hexavalent Chromium Emissions from Cooling Towers. The rule limits hexavalent chrome from cooling towers to less than 0.15 milligrams per liter (mg/L) and hexavalent chrome materials may not be added to the cooling tower water. SSU6 will not add hexavalent chrome materials to the circulating water in the cooling towers. Conservatively assuming that if all naturally occurring chrome were to be hexavalent chrome, the chrome content in the cooling tower, found from the brine analysis, would be 1.97×10^{-6} mg/L, which is well below the rule limit.

The proposed SSU6 Project is subject to ICAPCD regulations that apply to new sources of emissions, to certain prohibitory regulations that specify emission standards for individual equipment categories, and to the requirements for evaluation of impacts from toxic air pollutants. As proposed, the SSU6 Project will comply with these regulations.

5.15.5.4 Permits Required and Permit Schedule

The permits that are required along with the schedule for each are discussed in Table 5.15-13.

5.15.6 References

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Table 5.15-1
AIR TOXICS EMITTED FROM ALL OF THE OPERATIONS ASSOCIATED WITH THE SSU6 PROJECT

Pollutant	Cooling Towers	Diesel Equipment[1]	Dilution Water Heaters & LP Steam Vent Tank & Steam Lines	Well Flow Testing	Filter Cake	SP & HP Steam Vent Tanks & Steam Lines & PTU
Ammonia	X		X	X		X
Arsenic	X		X	X	X	X
Benzene	X			X	X	X
Beryllium	X		X	X	X	X
Cadmium	X		X	X	X	X
Chromium	X		X	X	X	X
Copper	X		X	X	X	X
Diesel-PM_{10}		X				
Ethylbenzene	X			X		X
Hydrogen sulfide	X		X	X		X
Lead	X		X	X	X	X
Manganese	X		X	X	X	X
Mercury	X		X	X	X	X
Nickel	X		X	X	X	X
Selenium	X		X	X		X
Toluene	X			X		X
Xylenes	X			X		X
Zinc	X		X	X	X	X
Radon	X			X	X	X

[1] Construction equipment, well-drilling equipment, operations and maintenance equipment, emergency generators and fire pump

Table 5.15-2
TOXIC EFFECTS AND CHRONIC AND ACUTE TOXICOLOGICAL ENDPOINTS FOR EACH AIR TOXIC ANALYZED

Pollutant	Carcinogen	Acute Non-Carcinogen	Chronic Non-Carcinogen	Toxicological Endpoint (Chronic)	Toxicological Endpoint (Acute)
Ammonia		X	X	Respiratory system	Eye and Respiratory irritation
Arsenic	X	X	X	Development, cardiovascular system, nervous system	Reproductive system
Benzene	X	X	X	Hematopoietic system, developmental, nervous system	Reproductive system
Beryllium	X		X	Respiratory system, immune system	
Cadmium	X		X	Kidney, respiratory system	
Chromium	X		X	Respiratory (hexavalent form only, also applies to carcinogenisis)	
Copper		X	X	Respiratory system	Respiratory irritation
Diesel-PM_{10}	X		X	Respiratory system	
Ethylbenzene			X	Development, alimentary system, kidney, endocrine system	
Hydrogen sulfide		X	X	Respiratory system	Respiratory irritation
Lead	X		X	Cardiovascular system, nervous system, immune system, kidney, reproductive system	
Manganese			X	Nervous system	
Mercury		X	X	Nervous system	Reproductive system
Nickel	X	X	X	Respiratory system, hematopoietic system	Respiratory irritation, Immune response
Selenium			X	Alimentary system, cardiovascular system, nervous system	
Toluene		X	X	Central or peripheral nervous system, respiratory system, and reproductive system including teratogenic and developmental effects	Central nervous system (mild), Eye and Respiratory irritation
Xylenes		X	X	Nervous system and respiratory system	Eye and Respiratory irritation
Zinc			X	Respiratory system, cardiovascular system	
Radon	X			Respiratory system	

Table 5.15-3
TOXICICOLOGICAL FACTORS USED IN THE HEALTH RISK ASSESSMENT MODELING

Pollutant	Cancer Unit Risk Factor ($\mu g/m^3)^{-1}$	Acute Reference Exposure Level ($\mu g/m^3$)	Chronic Reference Exposure Level ($\mu g/m^3$)
Ammonia	0.00E+00	3.20E+03	2.00E+02
Arsenic	3.30E-03	1.90E-01	3.00E-02
Benzene	2.90E-05	1.30E+03	6.00E+01
Beryllium	2.40E-03	0.00E+00	7.00E-03
Cadmium	4.20E-03	0.00E+00	2.00E-02
Chromium	1.50E-01	0.00E+00	2.00E-01
Copper	0.00E+00	1.00E+02	2.40E+00
Diesel-PM_{10}	3.00E-04	0.00E+00	5.00E+00
Ethylbenzene	0.00E+00	0.00E+00	2.00E+03
Hydrogen sulfide	0.00E+00	4.20E+01	1.00E+01
Lead	1.20E-05	0.00E+00	1.50E+00
Manganese	0.00E+00	0.00E+00	2.00E-01
Mercury	0.00E+00	1.80E+00	9.00E-02
Nickel	2.60E-04	6.00E+00	5.00E-02
Selenium	0.00E+00	0.00E+00	2.00E+01
Toluene	0.00E+00	3.70E+04	3.00E+02
Xylenes	0.00E+00	2.20E+04	7.00E+02
Zinc	0.00E+00	0.00E+00	3.50E+01
Radon	7.94E-01 ($\mu Ci/m^3)^{-1}$	0.00E+00	0.00E+00

Table 5.15-4
SOURCE LOCATIONS AND PARAMETERS USED IN ISCST3 FOR EMISSION SOURCES OF THE CONSTRUCTION PHASE OF THE SSU6 PROJECT

Source	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height Above Ground Level (m)	Temperature (K)	Exit Velocity (m/s)	Diameter (m)
Well Pad I	627092	3670738	-62.48	4.27	730.37	34.14	0.405
Well Pad C	627757	3670367	-69.49	4.27	730.37	34.14	0.405
Well Pad L	627817	3669889	-69.49	4.27	730.37	34.14	0.405
Construction Equipment 1	627910	3670360	-69.98	3.66	727.59	90.83	0.149
Construction Equipment 2	627911	3670595	-69.98	3.66	727.59	90.83	0.149
Construction Equipment 3	628284	3670595	-69.98	3.66	727.59	90.83	0.149
Construction Equipment 4	628283	3670359	-69.98	3.66	727.59	90.83	0.149
Well Flow Test (PTU)	628161	3670594	-70.10	15.24	381.32	12.19	2.743

Table 5.15-5
AIR TOXIC EMISSION RATES USED IN ACE2588 FOR THE CONSTRUCTION PHASE OF THE SSU6 PROJECT

Pollutant	Total Diesel Construction Equipment (g/s)	Well Drilling (per well) (g/s)	Well Flow Testing (PTU) (g/s)
Ammonia	-	-	8.93E+00
Arsenic	-	-	7.95E-04
Benzene	-	-	4.16E-02
Beryllium	-	-	5.18E-07
Cadmium	-	-	6.48E-05
Chromium	-	-	1.55E-07
Copper	-	-	2.07E-04
Diesel-PM_{10}	0.185	0.135	-
Ethylbenzene	-	-	2.45E-05
Hydrogen sulfide	-	-	2.23E+00
Lead	-	-	4.15E-03
Manganese	-	-	5.18E-02
Mercury	-	-	4.44E-06
Nickel	-	-	1.04E-06
Selenium	-	-	2.57E-07
Toluene	-	-	5.72E-04
Xylenes	-	-	7.01E-05
Zinc	-	-	1.68E-02
Radon (Ci/s)	-	-	3.76E-07

Table 5.15-6
AIR TOXIC EMISSION RATES USED IN ACE2588 FOR THE COMMISSIONING PHASE OF THE SSU6 PROJECT

Scenario 1					
Pollutant	**LP Steam Vent Tank (g/s)**	**SP Steam Vent Tank (g/s)**	**HP Steam Vent Tanks (g/s)**	**Dilution Water Heaters (g/s)**	**Production Test Unit (g/s)**
Ammonia	1.06E+00	4.25E+00	4.33E+01	1.02E+00	8.93E+00
Arsenic	4.50E-06	1.27E-04	1.12E-03	3.83E-07	7.95E-04
Benzene	0.00E+00	2.18E-02	1.96E-01	0.00E+00	4.16E-02
Beryllium	4.17E-09	3.35E-09	1.12E-05	3.55E-10	5.18E-07
Cadmium	5.21E-07	4.19E-07	1.30E-06	1.07E-10	6.48E-05
Chromium	1.25E-09	1.01E-09	3.11E-09	1.07E-10	1.55E-07
Copper	1.67E-06	1.34E-06	1.12E-05	1.42E-07	2.07E-04
Diesel-PM_{10}	-	-	-	-	-
Ethylbenzene	0.00E+00	1.29E-05	1.16E-04	0.00E+00	2.45E-05
Hydrogen sulfide	2.60E-01	8.34E-01	1.07E+01	4.19E-02	2.23E+00
Lead	3.34E-05	2.68E-05	8.28E-05	2.84E-06	4.15E-03
Manganese	4.17E-04	3.35E-04	1.04E-03	3.55E-05	5.18E-02
Mercury	1.94E-05	1.94E-05	1.95E-05	1.84E-05	4.44E-06
Nickel	8.34E-09	5.56E-09	2.08E-08	7.11E-10	1.04E-06
Selenium	2.07E-09	1.67E-09	5.15E-09	1.77E-10	2.57E-07
Toluene	0.00E+00	3.00E-04	2.69E-03	0.00E+00	5.72E-04
Xylenes	0.00E+00	3.67E-05	3.30E-04	0.00E+00	7.01E-05
Zinc	1.33E-04	1.09E-04	3.37E-04	1.15E-05	1.68E-02
Radon (Ci/s)	0.00E+00	8.90E-05	8.03E-04	0.00E+00	3.76E-07
Scenario 2					
Pollutant	**LP Steam Vent Tank (g/s)**	**SP Steam Vent Tank (g/s)**	**HP Steam Vent Tanks (g/s)**	**Dilution Water Heaters (g/s)**	
Ammonia	1.37E+00	5.47E+00	5.56E+01	1.31E+00	
Arsenic	5.78E-06	1.64E-04	1.44E-03	4.93E-07	
Benzene	0.00E+00	2.80E-02	2.52E-01	0.00E+00	
Beryllium	5.36E-09	4.31E-09	1.44E-05	4.56E-10	
Cadmium	6.70E-07	5.39E-07	1.67E-06	1.37E-10	
Chromium	1.60E-09	1.30E-09	4.00E-09	1.37E-10	

Table 5.15-6 (continued)
AIR TOXIC EMISSION RATES USED IN ACE2588 FOR THE COMMISSIONING PHASE OF THE SSU6 PROJECT

Scenario 2 (continued)					
Pollutant	**LP Steam Vent Tank (g/s)**	**SP Steam Vent Tank (g/s)**	**HP Steam Vent Tanks (g/s)**	**Dilution Water Heaters (g/s)**	
Copper	2.15E-06	1.72E-06	1.44E-05	1.83E-07	
Diesel-PM_{10}	-	-	-	-	
Ethylbenzene	0.00E+00	1.65E-05	1.49E-04	0.00E+00	
Hydrogen sulfide	3.34E-01	1.07E+00	1.37E+01	5.39E-02	
Lead	4.29E-05	3.45E-05	1.06E-04	3.65E-06	
Manganese	5.36E-04	4.31E-04	1.33E-03	4.56E-05	
Mercury	2.49E-05	2.49E-05	2.51E-05	2.37E-05	
Nickel	1.07E-08	7.15E-09	2.67E-08	9.14E-10	
Selenium	2.66E-09	2.15E-09	6.63E-09	2.27E-10	
Toluene	0.00E+00	3.85E-04	3.46E-03	0.00E+00	
Xylenes	0.00E+00	4.72E-05	4.24E-04	0.00E+00	
Zinc	1.72E-04	1.40E-04	4.33E-04	1.48E-05	
Radon (Ci/s)	0.00E+00	1.14E-04	1.03E-03	0.00E+00	
Scenario 3a					
Pollutant	**LP Steam Vent Tank (g/s)**	**SP Steam Vent Tank (g/s)**	**HP Steam Vent Tank (g/s)**	**Dilution Water Heaters (g/s)**	**HP Steam Line (g/s)**
Ammonia	1.37E+00	5.47E+00	2.78E+01	1.31E+00	2.78E+01
Arsenic	5.78E-06	1.64E-04	7.22E-04	4.93E-07	7.22E-04
Benzene	0.00E+00	2.80E-02	1.26E-01	0.00E+00	1.26E-01
Beryllium	5.36E-09	4.31E-09	7.20E-06	4.56E-10	7.20E-06
Cadmium	6.70E-07	5.39E-07	8.34E-07	1.37E-10	8.34E-07
Chromium	1.60E-09	1.30E-09	2.00E-09	1.37E-10	2.00E-09
Copper	2.15E-06	1.72E-06	7.20E-06	1.83E-07	7.20E-06
Diesel-PM_{10}	-	-	-	-	-
Ethylbenzene	0.00E+00	1.65E-05	7.43E-05	0.00E+00	7.43E-05
Hydrogen sulfide	3.34E-01	1.07E+00	6.86E+00	5.39E-02	6.86E+00
Lead	4.29E-05	3.45E-05	5.32E-05	3.65E-06	5.32E-05
Manganese	5.36E-04	4.31E-04	6.67E-04	4.56E-05	6.67E-04

Table 5.15-6 (continued)
AIR TOXIC EMISSION RATES USED IN ACE2588 FOR THE COMMISSIONING PHASE OF THE SSU6 PROJECT

Scenario 3a (continued)					
Pollutant	**LP Steam Vent Tank (g/s)**	**SP Steam Vent Tank (g/s)**	**HP Steam Vent Tank (g/s)**	**Dilution Water Heaters (g/s)**	**HP Steam Line (g/s)**
Mercury	2.49E-05	2.49E-05	1.26E-05	2.37E-05	1.26E-05
Nickel	1.07E-08	7.15E-09	1.33E-08	9.14E-10	1.33E-08
Selenium	2.66E-09	2.15E-09	3.31E-09	2.27E-10	3.31E-09
Toluene	0.00E+00	3.85E-04	1.73E-03	0.00E+00	1.73E-03
Xylenes	0.00E+00	4.72E-05	2.12E-04	0.00E+00	2.12E-04
Zinc	1.72E-04	1.40E-04	2.17E-04	1.48E-05	2.17E-04
Radon (Ci/s)	0.00E+00	1.14E-04	5.16E-04	0.00E+00	5.16E-04
Scenario 3b					
Pollutant	**LP Steam Vent Tank (g/s)**	**SP Steam Vent Tank (g/s)**	**HP Steam Vent Tanks (g/s)**	**Dilution Water Heaters (g/s)**	**SP Steam Line (g/s)**
Ammonia	1.37E+00	2.73E+00	5.56E+01	1.31E+00	2.73E+00
Arsenic	5.78E-06	8.18E-05	1.44E-03	4.93E-07	8.18E-05
Benzene	0.00E+00	1.40E-02	2.52E-01	0.00E+00	1.40E-02
Beryllium	5.36E-09	2.15E-09	1.44E-05	4.56E-10	2.15E-09
Cadmium	6.70E-07	2.69E-07	1.67E-06	1.37E-10	2.69E-07
Chromium	1.60E-09	6.48E-10	4.00E-09	1.37E-10	6.48E-10
Copper	2.15E-06	8.62E-07	1.44E-05	1.83E-07	8.62E-07
Diesel-PM_{10}	-	-	-	-	-
Ethylbenzene	0.00E+00	8.26E-06	1.49E-04	0.00E+00	8.26E-06
Hydrogen sulfide	3.34E-01	5.36E-01	1.37E+01	5.39E-02	5.36E-01
Lead	4.29E-05	1.72E-05	1.06E-04	3.65E-06	1.72E-05
Manganese	5.36E-04	2.15E-04	1.33E-03	4.56E-05	2.15E-04
Mercury	2.49E-05	1.25E-05	2.51E-05	2.37E-05	1.25E-05
Nickel	1.07E-08	3.58E-09	2.67E-08	9.14E-10	3.58E-09
Selenium	2.66E-09	1.07E-09	6.63E-09	2.27E-10	1.07E-09
Toluene	0.00E+00	1.93E-04	3.46E-03	0.00E+00	1.93E-04
Xylenes	0.00E+00	2.36E-05	4.24E-04	0.00E+00	2.36E-05
Zinc	1.72E-04	6.99E-05	4.33E-04	1.48E-05	6.99E-05
Radon (Ci/s)	0.00E+00	5.72E-05	1.03E-03	0.00E+00	5.72E-05

Table 5.15-6 (continued)
AIR TOXIC EMISSION RATES USED IN ACE2588 FOR THE COMMISSIONING PHASE OF THE SSU6 PROJECT

Scenario 3c					
Pollutant	**LP Steam Vent Tank (g/s)**	**SP Steam Vent Tank (g/s)**	**HP Steam Vent Tanks (g/s)**	**Dilution Water Heaters (g/s)**	**LP Steam Line (g/s)**
Ammonia	6.83E-01	5.47E+00	5.56E+01	1.31E+00	6.83E-01
Arsenic	2.89E-06	1.64E-04	1.44E-03	4.93E-07	2.89E-06
Benzene	0.00E+00	2.80E-02	2.52E-01	0.00E+00	0.00E+00
Beryllium	2.68E-09	4.31E-09	1.44E-05	4.56E-10	2.68E-09
Cadmium	3.35E-07	5.39E-07	1.67E-06	1.37E-10	3.35E-07
Chromium	8.02E-10	1.30E-09	4.00E-09	1.37E-10	8.02E-10
Copper	1.07E-06	1.72E-06	1.44E-05	1.83E-07	1.07E-06
Diesel-PM_{10}	-	-	-	-	-
Ethylbenzene	0.00E+00	1.65E-05	1.49E-04	0.00E+00	0.00E+00
Hydrogen sulfide	1.67E-01	1.07E+00	1.37E+01	5.39E-02	1.67E-01
Lead	2.15E-05	3.45E-05	1.06E-04	3.65E-06	2.15E-05
Manganese	2.68E-04	4.31E-04	1.33E-03	4.56E-05	2.68E-04
Mercury	1.25E-05	2.49E-05	2.51E-05	2.37E-05	1.25E-05
Nickel	5.36E-09	7.15E-09	2.67E-08	9.14E-10	5.36E-09
Selenium	1.33E-09	2.15E-09	6.63E-09	2.27E-10	1.33E-09
Toluene	0.00E+00	3.85E-04	3.46E-03	0.00E+00	0.00E+00
Xylenes	0.00E+00	4.72E-05	4.24E-04	0.00E+00	0.00E+00
Zinc	8.58E-05	1.40E-04	4.33E-04	1.48E-05	8.58E-05
Radon (Ci/s)	0.00E+00	1.14E-04	1.03E-03	0.00E+00	0.00E+00

Table 5.15-7
SOURCE LOCATIONS AND PARAMETERS USED IN ISCST3 FOR THE COMMISSIONING PHASE OF THE SSU6 PROJECT

Source	Scenario	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height Above Ground Level (m)	Temperature (K)	Exit Velocity (m/s)	Diameter (m)
LP Steam Vent Tank	1	628085	3670601	-70.10	18.29	392.09	12.16	3.048
SP Steam Vent Tank	1	628100	3670601	-70.10	18.29	421.43	10.30	3.048
HP Steam Vent Tank 1	1	628115	3670601	-70.10	18.29	434.37	11.95	3.048
HP Steam Vent Tank 2	1	628130	3670601	-70.10	18.29	434.37	11.95	3.048
Dilution Water Heater 1	1	627938	3670583	-70.10	13.72	373.76	4.75	2.438
Dilution Water Heater 2	1	627938	3670548	-70.10	13.72	373.76	4.75	2.438
Production Test Unit	1	628161	3670594	-70.10	15.24	381.32	12.19	2.743
LP Steam Vent Tank	2	628085	3670601	-70.10	18.29	392.09	15.64	3.048
SP Steam Vent Tank	2	628100	3670601	-70.10	18.29	421.43	13.23	3.048
HP Steam Vent Tank 1	2	628115	3670601	-70.10	18.29	434.37	15.36	3.048
HP Steam Vent Tank 2	2	628130	3670601	-70.10	18.29	434.37	15.36	3.048
Dilution Water Heater 1	2	627938	3670583	-70.10	13.72	373.76	6.13	2.438
Dilution Water Heater 2	2	627938	3670548	-70.10	13.72	373.76	6.13	2.438
LP Steam Vent Tank	3a	628085	3670601	-70.10	18.29	392.09	15.64	3.048
SP Steam Vent Tank	3a	628100	3670601	-70.10	18.29	421.43	13.23	3.048
HP Steam Vent Tank 2	3a	628130	3670601	-70.10	18.29	434.37	15.36	3.048
Dilution Water Heater 1	3a	627938	3670583	-70.10	13.72	373.76	6.13	2.438
Dilution Water Heater 2	3a	627938	3670548	-70.10	13.72	373.76	6.13	2.438
HP Steam Line 1	3a	627928	3670385	-70.10	12.19	434.26	87.48	0.762
HP Steam Line 2	3a	627930	3670385	-70.10	12.19	434.26	87.48	0.762
LP Steam Vent Tank	3b	628085	3670601	-70.10	18.29	392.09	15.64	3.048
SP Steam Vent Tank	3b	628100	3670601	-70.10	18.29	421.43	6.61	3.048
HP Steam Vent Tank 1	3b	628115	3670601	-70.10	18.29	434.37	15.36	3.048
HP Steam Vent Tank 2	3b	628130	3670601	-70.10	18.29	434.37	15.36	3.048
Dilution Water Heater 1	3b	627938	3670583	-70.10	13.72	373.76	6.13	2.438
Dilution Water Heater 2	3b	627938	3670548	-70.10	13.72	373.76	6.13	2.438
SP Steam Line 1	3b	627927	3670385	-70.10	12.19	421.48	59.44	0.762
SP Steam Line 2	3b	627931	3670385	-70.10	12.19	421.48	59.44	0.762
LP Steam Vent Tank	3c	628085	3670601	-70.10	18.29	392.09	7.83	3.048
SP Steam Vent Tank	3c	628100	3670601	-70.10	18.29	421.43	13.23	3.048
HP Steam Vent Tank 1	3c	628115	3670601	-70.10	18.29	434.37	15.36	3.048
HP Steam Vent Tank 2	3c	628130	3670601	-70.10	18.29	434.37	15.36	3.048
Dilution Water Heater 1	3c	627938	3670583	-70.10	13.72	373.76	6.13	2.438
Dilution Water Heater 2	3c	627938	3670548	-70.10	13.72	373.76	6.13	2.438
LP Steam Line 1	3c	627926	3670385	-70.10	12.19	392.04	96.32	0.914
LP Steam Line 2	3c	627932	3670385	-70.10	12.19	392.04	96.32	0.914

Table 5.15-8
ANNUAL AIR TOXIC EMISSION RATES USED IN ACE2588 FOR THE ROUTINE OPERATIONS OF THE SSU6 PROJECT

Pollutant	Cooling Tower (all cells) (g/s)	Cooling Tower Oxidizer Cells (g/s)	Dilution Water Heaters (g/s)	Emergency Generator 480 (g/s)	Emergency Generator 4160 (g/s)	Fire Pump (g/s)	Filter Cake Total (g/s)	Sulfur Cake (g/s)	Operations & Maintenance Equipment (g/s)
Ammonia	1.53E-02	7.72E+01	2.09E+00	-	-	-	-	-	-
Arsenic	2.53E-04	-	7.82E-07	-	-	-	3.63E-08	-	-
Benzene	2.22E-02	-	-	-	-	-	-	8.40E-15	-
Beryllium	8.12E-10	-	7.24E-10	-	-	-	1.21E-09	-	-
Cadmium	1.01E-07	-	9.05E-08	-	-	-	2.42E-11	-	-
Chromium	2.44E-10	-	2.17E-10	-	-	-	1.21E-10	-	-
Copper	3.25E-07	-	2.90E-07	-	-	-	3.03E-08	-	-
Diesel-PM_{10}	-	-	-	8.36E-05	1.86E-03	1.29E-04	-	-	2.34E-04
Ethylbenzene	7.49E-05	-	-	-	-	-	-	-	-
Hydrogen sulfide	9.66E-02	2.13E-01	8.55E-02	-	-	-	-	-	-
Lead	6.51E-06	-	5.80E-06	-	-	-	3.63E-09	-	-
Manganese	8.12E-05	-	7.24E-05	-	-	-	4.24E-07	-	-
Mercury	2.62E-05	-	3.76E-05	-	-	-	-	9.24E-12	-
Nickel	1.62E-09	-	1.45E-09	-	-	-	1.82E-10	-	-
Selenium	4.04E-10	-	3.61E-10	-	-	-	-	-	-
Toluene	6.12E-04	-	-	-	-	-	-	-	-
Xylenes	7.49E-05	-	-	-	-	-	-	-	-
Zinc	2.65E-05	-	2.36E-05	-	-	-	1.57E-08	-	-
Radon (Ci/s)	4.00E-06	-	-	-	-	-	1.51E-09	-	-

Table 5.15-9
ONE-HOUR AIR TOXIC EMISSION RATES USED IN ACE2588 FOR THE ROUTINE OPERATIONS OF THE SSU6 PROJECT

Pollutant	Cooling Tower (all cells) (g/s)	Cooling Tower Oxidizer Cells (g/s)	Dilution Water Heaters (g/s)	Emergency Generator 480 (g/s)	Emergency Generator 4160 (g/s)	Fire Pump (g/s)	Filter Cake Total (g/s)	Sulfur Cake (g/s)	Operations & Maintenance Equipment (g/s)
Ammonia	1.53E-02	8.98E+01	2.09E+00	-	-	-	-	-	-
Arsenic	2.53E-04	-	7.82E-07	-	-	-	4.84E-07	-	-
Benzene	2.22E-02	-	-	-	-	-	-	5.60E-14	-
Beryllium	8.12E-10	-	7.24E-10	-	-	-	1.61E-08	-	-
Cadmium	1.01E-07	-	9.05E-08	-	-	-	3.23E-10	-	-
Chromium	2.44E-10	-	2.17E-10	-	-	-	1.61E-09	-	-
Copper	3.25E-07	-	2.90E-07	-	-	-	4.03E-07	-	-
Diesel-PM_{10}	-	-	-	3.66E-03	8.15E-02	5.64E-03	-	-	6.57E-03
Ethylbenzene	7.49E-05	-	-	-	-	-	-	-	-
Hydrogen sulfide	9.66E-02	2.13E-01	8.55E-02	-	-	-	-	-	-
Lead	6.51E-06	-	5.80E-06	-	-	-	4.84E-08	-	-
Manganese	8.12E-05	-	7.24E-05	-	-	-	5.65E-06	-	-
Mercury	2.62E-05	-	3.76E-05	-	-	-	-	6.16E-11	-
Nickel	1.62E-09	-	1.45E-09	-	-	-	2.42E-09	-	-
Selenium	4.04E-10	-	3.61E-10	-	-	-	-	-	-
Toluene	6.12E-04	-	-	-	-	-	-	-	-
Xylenes	7.49E-05	-	-	-	-	-	-	-	-
Zinc	2.65E-05	-	2.36E-05	-	-	-	2.10E-07	-	-
Radon (Ci/s)	4.00E-06	-	-	-	-	-	3.01E-09	-	-

Table 5.15-10
SOURCE LOCATIONS AND PARAMETERS USED IN ISCST3 FOR THE ROUTINE OPERATIONS OF THE SSU6 PROJECT

Point Sources	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height Above Ground Level (m)	Temperature (K)	Exit Velocity (m/s)	Diameter (m)
Cooling Tower Cell A	628075	3670425	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell B	628086	3670413	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell C	628098	3670402	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell D	628110	3670390	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell E	628121	3670378	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell F	628133	3670367	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell G	628145	3670355	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell H	628157	3670344	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell I	628168	3670332	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell J	628179	3670320	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell K	628330	3670410	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell L	628343	3670399	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell M	628354	3670387	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell N	628365	3670376	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell O	628377	3670364	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell P	628389	3670352	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell Q	628401	3670341	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell R	628412	3670330	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell S	628424	3670318	-70.104	17.6784	300.09	10.0584	9.7536
Cooling Tower Cell T	628436	3670306	-70.104	17.6784	300.09	10.0584	9.7536
Dilution Water Heater 1	627938	3670583	-70.104	13.716	373.76	9.32688	2.4384
Dilution Water Heater 2	627938	3670548	-70.104	13.716	373.76	9.32688	2.4384
Emergency Generator 480	627907	3670345	-70.104	12.192	695.93	39.0144	0.204
Emergency Generator 4160	628032	3670474	-70.104	18.288	790.37	48.768	0.4572
Fire Pump	628024	3670422	-70.104	12.192	730.37	39.0144	0.1524
Operations & Maintenance Equipment 1	627854	3670615	-70.104	3.6576	727.59	90.5256	0.1015
Operations & Maintenance Equipment 2	627854	3670528	-70.104	3.6576	727.59	90.5256	0.1015
Operations & Maintenance Equipment 3	627855	3670441	-70.104	3.6576	727.59	90.5256	0.1015
Operations & Maintenance Equipment 4	627855	3670354	-70.104	3.6576	727.59	90.5256	0.1015
Operations & Maintenance Equipment 5	627960	3670615	-70.104	3.6576	727.59	90.5256	0.1015

Table 5.15-10 (continued)
SOURCE LOCATIONS AND PARAMETERS USED IN ISCST3 FOR THE ROUTINE OPERATIONS OF THE SSU6 PROJECT

Point Sources	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height Above Ground Level (m)	Temperature (K)	Exit Velocity (m/s)	Diameter (m)
Operations & Maintenance Equipment 6	627960	3670529	-70.104	3.6576	727.59	90.5256	0.1015
Operations & Maintenance Equipment 7	627962	3670442	-70.104	3.6576	727.59	90.5256	0.1015
Operations & Maintenance Equipment 8	627962	3670356	-70.104	3.6576	727.59	90.5256	0.1015
Operations & Maintenance Equipment 9	628066	3670616	-70.104	3.6576	727.59	90.5256	0.1015
Operations & Maintenance Equipment 10	628066	3670530	-70.104	3.6576	727.59	90.5256	0.1015
Operations & Maintenance Equipment 11	628068	3670443	-70.104	3.6576	727.59	90.5256	0.1015
Operations & Maintenance Equipment 12	628068	3670357	-70.104	3.6576	727.59	90.5256	0.1015
Volume Sources	**UTM Easting (m)**	**UTM Northing (m)**	**Elevation (m)**	**Release Height Above Ground Level (m)**	**Horizontal Dimension (m)**	**Vertical Dimension (m)**	
Filter Cake 1	627974	3670630	-70.104	3.6576	2.4811	1.7	
Filter Cake 2	628013	3670630	-70.104	3.6576	2.4811	1.7	
Sulfur Cake	628126	3670468	-70.104	3.6576	2.4811	1.7	

Table 5.15-11
AIR TOXIC EMISSION RATES USED IN ACE2588 FOR THE TEMPORARY OPERATIONS OF THE SSU6 PROJECT

Pollutant	Injection Well Test (g/s)	Cooling Towers (g/s)	Dilution Water Heaters (g/s)	LP Steam Vent Tank (g/s)	SP Steam Vent Tank (g/s)
Scenario	**1**	**2**	**2**	**2**	**2**
Ammonia	7.44E+00	6.89E+01	2.09E+00	2.17E+00	8.68E+00
Arsenic	5.22E-04	2.53E-04	7.72E-07	9.18E-06	2.60E-04
Benzene	3.46E-02	2.22E-02	0.00E+00	0.00E+00	4.44E-02
Beryllium	3.01E-07	7.89E-10	7.16E-10	8.51E-09	6.84E-09
Cadmium	3.77E-05	9.86E-08	8.95E-08	1.06E-06	8.55E-07
Chromium	9.05E-08	2.37E-10	2.15E-10	2.55E-09	2.06E-09
Copper	1.20E-04	3.15E-07	2.85E-07	3.41E-06	2.74E-06
Diesel-PM_{10}	-	-	-	-	-
Ethylbenzene	2.04E-05	2.62E-05	0.00E+00	0.00E+00	2.62E-05
Hydrogen sulfide	1.86E+00	2.59E-01	8.55E-02	5.31E-01	1.70E+00
Lead	2.42E-03	6.31E-06	5.73E-06	6.81E-05	5.47E-05
Manganese	3.01E-02	7.89E-05	7.16E-05	8.51E-04	6.84E-04
Mercury	5.18E-06	2.67E-06	3.76E-05	3.96E-05	3.96E-05
Nickel	6.05E-07	1.58E-09	1.43E-09	1.70E-08	1.14E-08
Selenium	1.50E-07	3.91E-10	3.56E-10	4.22E-09	3.41E-09
Toluene	4.77E-04	6.10E-04	0.00E+00	0.00E+00	6.12E-04
Xylenes	5.84E-05	7.49E-05	0.00E+00	0.00E+00	7.49E-05
Zinc	9.81E-03	2.57E-05	2.33E-05	2.72E-04	2.22E-04
Radon (Ci/s)	3.13E-07	4.00E-06	0.00E+00	0.00E+00	4.00E-07
Pollutant	**Cooling Towers (g/s)**	**Dilution Water Heaters (g/s)**	**LP Steam Vent Tank (g/s)**	**SP Steam Vent Tank (g/s)**	**Production Test Unit (g/s)**
Scenario	**3**	**3**	**3**	**3**	**3**
Ammonia	4.82E+00	1.46E-01	1.52E-01	6.07E-01	8.93E+00
Arsenic	1.85E-05	5.40E-08	6.43E-07	1.82E-05	7.95E-04
Benzene	1.55E-03	0.00E+00	0.00E+00	3.11E-03	4.16E-02
Beryllium	8.12E-10	5.01E-11	5.96E-10	4.78E-10	5.18E-07
Cadmium	1.01E-07	6.27E-09	7.44E-08	5.99E-08	6.48E-05
Chromium	2.44E-10	1.50E-11	1.78E-10	1.44E-10	1.55E-07
Copper	3.25E-07	2.00E-08	2.38E-07	1.92E-07	2.07E-04
Diesel-PM_{10}	-	-	-	-	-
Ethylbenzene	1.84E-06	0.00E+00	0.00E+00	1.84E-06	2.45E-05

Table 5.15-11 (continued)
AIR TOXIC EMISSION RATES USED IN ACE2588 FOR THE TEMPORARY OPERATIONS OF THE SSU6 PROJECT

Pollutant	Cooling Towers (g/s)	Dilution Water Heaters (g/s)	LP Steam Vent Tank (g/s)	SP Steam Vent Tank (g/s)	Production Test Unit (g/s)
Scenario	**3**	**3**	**3**	**3**	**3**
Hydrogen sulfide	1.82E-02	5.99E-03	3.72E-02	1.19E-01	2.23E+00
Lead	6.51E-06	4.01E-07	4.77E-06	3.83E-06	4.15E-03
Manganese	8.12E-05	5.01E-06	5.96E-05	4.78E-05	5.18E-02
Mercury	1.91E-07	2.63E-06	2.77E-06	2.77E-06	4.44E-06
Nickel	2.05E-10	1.00E-10	1.19E-09	7.95E-10	1.04E-06
Selenium	5.09E-11	2.49E-11	2.96E-10	2.38E-10	2.57E-07
Toluene	4.28E-05	0.00E+00	0.00E+00	4.28E-05	5.72E-04
Xylenes	5.24E-06	0.00E+00	0.00E+00	5.24E-06	7.01E-05
Zinc	2.65E-05	1.63E-06	1.91E-05	1.55E-05	1.68E-02
Radon (Ci/s)	2.80E-07	0.00E+00	0.00E+00	2.80E-08	3.76E-07

Table 5.15-12
SOURCE LOCATIONS AND PARAMETERS USED IN ISCST3 FOR THE TEMPORARY OPERATIONS OF THE SSU6 PROJECT

Sources	Scenario	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height Above Ground Level (m)	Temperature (K)	Exit Velocity (m/s)	Diameter (m)
Injection Well Test	1	627760	3670616	-69.49	11.56	381.32	14.84	1.829
Cooling Tower Cell A	2	628075	3670425	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell B	2	628086	3670413	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell C	2	628098	3670402	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell D	2	628110	3670390	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell E	2	628121	3670378	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell F	2	628133	3670367	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell G	2	628145	3670355	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell H	2	628157	3670344	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell I	2	628168	3670332	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell J	2	628179	3670320	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell K	2	628330	3670410	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell L	2	628343	3670399	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell M	2	628354	3670387	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell N	2	628365	3670376	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell O	2	628377	3670364	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell P	2	628389	3670352	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell Q	2	628401	3670341	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell R	2	628412	3670330	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell S	2	628424	3670318	-70.10	17.68	305.54	10.09	9.754
Cooling Tower Cell T	2	628436	3670306	-70.10	17.68	305.54	10.09	9.754
Dilution Water Heater 1	2	627938	3670583	-70.10	13.72	373.76	9.72	2.438
Dilution Water Heater 2	2	627938	3670548	-70.10	13.72	373.76	9.72	2.438
LP Steam Vent Tank	2	628085	3670601	-70.10	18.29	392.09	24.84	3.048
SP Steam Vent Tank	2	628100	3670601	-70.10	18.29	421.43	21.00	3.048
Cooling Tower Cell A	3	628075	3670425	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell B	3	628086	3670413	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell C	3	628098	3670402	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell D	3	628110	3670390	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell E	3	628121	3670378	-70.10	17.68	308.76	10.09	9.754

Table 5.15-12 (continued)
SOURCE LOCATIONS AND PARAMETERS USED IN ISCST3 FOR THE TEMPORARY OPERATIONS OF THE SSU6 PROJECT

Sources	Scenario	UTM Easting (m)	UTM Northing (m)	Elevation (m)	Stack Height Above Ground Level (m)	Temperature (K)	Exit Velocity (m/s)	Diameter (m)
Cooling Tower Cell F	3	628133	3670367	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell G	3	628145	3670355	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell H	3	628157	3670344	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell I	3	628168	3670332	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell J	3	628179	3670320	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell K	3	628330	3670410	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell L	3	628343	3670399	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell M	3	628354	3670387	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell N	3	628365	3670376	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell O	3	628377	3670364	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell P	3	628389	3670352	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell Q	3	628401	3670341	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell R	3	628412	3670330	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell S	3	628424	3670318	-70.10	17.68	308.76	10.09	9.754
Cooling Tower Cell T	3	628436	3670306	-70.10	17.68	308.76	10.09	9.754
Dilution Water Heater 1	3	627938	3670583	-70.10	13.72	373.76	0.68	2.438
Dilution Water Heater 2	3	627938	3670548	-70.10	13.72	373.76	0.68	2.438
LP Steam Vent Tank	3	628085	3670601	-70.10	18.29	392.09	1.74	3.048
SP Steam Vent Tank	3	628100	3670601	-70.10	18.29	421.43	1.47	3.048
Production Test Unit	3	628161	3670594	-70.10	15.24	381.32	12.19	2.743

Table 5.15-13
SUMMARY OF LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Jurisdiction	LORS	Requirements	Conformance Section	Schedule of Permit	Administering Agency	Agency Contact
5.15 Public Health LORS						
Federal						
	National Emissions Standards for Hazardous Air Pollutants (NESHAP): Clean Air Act §112, 42 USC §7401 *et seq.*; 40 CFR Part 63	Establishes national emission standards to limit HAPs from existing major sources of HAP emissions.	Section 5.15.5.1, Public Health LORS; Section 5.1.5.1, Air Quality LORS	Agency approval to be obtained before start of construction.	ICAPCD with USEPA Region IX oversight.	1, 2
	Toxic Chemical Release Inventory Program: Emergency Planning and Community Right-to-Know Act (EPCRA) § 313.	Facilities must report toxic releases to the environment if they produce or use large quantities of a regulated substance.	Section 5.15.5.1, Public Health LORS	Not Applicable	USEPA Region IX	2
State						
	California Clean Air Act, Toxic Air Contaminant (TAC) Program: California Health & Safety Code §39650 – 39675.	Requires projects to prepare a health risk assessment. Meet requirements for Best Available Control Technology to minimize exposure limits to toxic air pollutants.	Section 5.15.5.2, Public Health LORS	Not Applicable	ICAPCD with CARB oversight.	1, 4
	Air Toxic "Hot Spots" Act: California Health & Safety Code §44300-44384; 17 CCR §93300-93347	Requires preparation and biennial updating of facility emission inventory of hazardous substances; risk assessments, notification, and plans to reduce risks.	Section 5.1.5.2, Air Quality LORS; Section 5.15.5.2, Public Health LORS.	After project review, the agency issues a PTC with conditions limiting emissions. Screening health risk assessment (HRA) submitted as part of AFC; CEC approval of AFC.	ICAPCD, with CARB oversight.	1, 4
	Public Nuisance California Health & Safety Code § 41700	Prohibits emissions in quantities that adversely affect public health, other businesses, or property.	Section 5.1.5.2 Air Quality LORS.	After project review, the agency issues a permit with conditions limiting emissions.	ICAPCD, with CARB oversight.	1, 4

Table 5.15-13 (continued)
SUMMARY OF LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Jurisdiction	LORS	Requirements	Conformance Section	Schedule of Permit	Administering Agency	Agency Contact
	California Health & Safety Code, §25500 to 25541; 19 CCR §§2720-2734.	Requires a business plan for emergency responses to a release or threatened release of hazardous material or mixture.	Section 5.14.5.2. Hazardous Materials Handling LORS.	Permit obtained before storage of hazardous materials on site.	Imperial County Public Health Department Environmental Health Services Division	5
	CEC and CARB Memorandum of Understanding: California Public Resource Code §25523(a); 20 CCR §1752, 1752.5, 2300-2309, and Division 2, Chapter 5, Article 1, Appendix B, Part (k).	Requires that CEC's decision on PTC include requirements to assure protection of environmental quality. AFC is required to include a quantitative risk assessment.	Section 5.15.5.2, Public Health LORS	After project review, CEC issues Final Determination of Compliance with conditions limiting emissions.	CEC	3
Local						
	ICAPCD Rule 216, 1001, 1002, 1003	Regulations pertaining to the implementation of New and Modified Stationary Source Review, NESHAP, California Airborne Toxic Control Measures and the limitation of Hexavalent Chromium Emissions from Cooling Towers.	Section 5.15.5.3, Public Health LORS	Not Applicable	ICAPCD	1

Table 5.15-14
AGENCY CONTACT LIST FOR LORS

Federal			
2	U.S. Environmental Protection Agency, Region IX Mr. Gerald Rios 75 Hawthorne Street San Francisco, California 94105 (415) 744-1254		
State			
4	California Air Resources Board Mr. Mike Tolstrup 1001 I Street Sacramento, California 95814 (916) 322-6026	3	California Energy Commission Mr. Paul C. Richins Energy Facilities Licensing Manager 1516 9th Street, MS 15 Sacramento, CA 95814 (916) 654-4074 (916) 654-3882 prichins@energy.state.ca.us
Local			
5	Imperial County Department of Public Health Environmental Health Services Division Nick del Valle, Registered Environmental Health Specialist II (760) 482-4203	1	Imperial County Air Pollution Control District Mr. Steven Birdsall 150 South 9th Street El Centro, CA 92243-2801 (760) 482-4606